

AL

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
17 January 2002 (17.01.2002)

PCT

(10) International Publication Number  
**WO 02/03989 A2**

(51) International Patent Classification<sup>7</sup>: **A61K 31/404**,  
31/454, 31/439, 31/496, 31/55, A61P 1/00, 13/00, A61K  
45/06

Thomas, Michael; 1008 Darby Drive, Yardley, PA 19067  
(US). MILLER, Christopher, Paul; 72 Meadowbrook  
Road, Strafford, PA 19087 (US).

(21) International Application Number: PCT/US01/21081

(74) Agents: MILOWSKY, Arnold, S.; American Home Products Corporation, Patent Law Department, Five Giralda Farms, Madison, NJ 07940 et al. (US).

(22) International Filing Date: 29 June 2001 (29.06.2001)

(25) Filing Language: English

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

(26) Publication Language: English

(30) Priority Data:  
60/216,185 6 July 2000 (06.07.2000) US  
60/216,186 6 July 2000 (06.07.2000) US

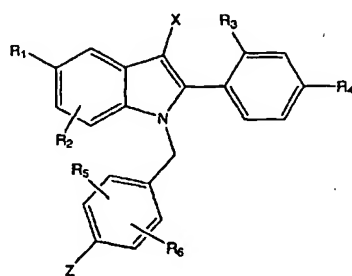
(71) Applicant: AMERICAN HOME PRODUCTS CORPORATION [US/US]; Five Giralda Farms, Madison, NJ 07940-0874 (US).

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

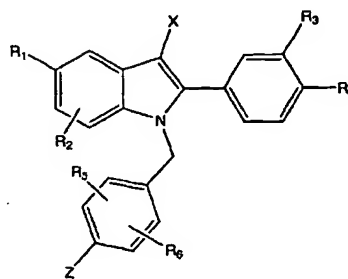
(72) Inventors: JENKINS, Simon, Nicholas; 3011 Timothy's Trail, Audubon, PA 19403 (US). ARGENTIERI,

[Continued on next page]

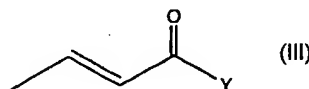
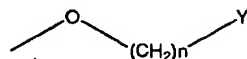
(54) Title: THERAPY FOR INHIBITING SPHINCTER INCONTINENCE



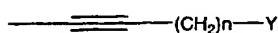
(I)



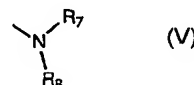
(II)



(III)



(IV)



(V)

(57) Abstract: This invention comprises methods of inducing or maintaining sphincter continence, or inhibiting or alleviating incontinence, in a mammal comprising administration of a compound of the formulae I or II: wherein Z is a moiety selected from the group of formulae III or IV wherein: R<sub>1</sub> is selected from H, OH or the C<sub>1</sub>-C<sub>12</sub> esters or C<sub>1</sub>-C<sub>12</sub> alkyl ethers thereof, benzyloxy, or halogens; or C1-C4 halogenated; R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, and R<sub>6</sub> are H, OH or C<sub>1</sub>-C<sub>12</sub> esters or C<sub>1</sub>-C<sub>12</sub> alkyl ethers thereof, halogens, or C<sub>1</sub>-C<sub>4</sub> halogenated ethers, CN, C<sub>1</sub>-C<sub>6</sub> alkyl, or CF<sub>3</sub>, with the proviso that, when R<sub>1</sub> is H, R<sub>2</sub> is not OH; Y is the moiety formulae V: R<sub>7</sub> and R<sub>8</sub> are alkyl or concatenated together to form an optionally substituted, nitrogen-containing ring; or a pharmaceutically acceptable salt thereof and optionally an estrogen.



**Published:**

- without international search report and to be republished upon receipt of that report

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## **THERAPY FOR INHIBITING SPHINCTER INCONTINENCE**

5 This invention relates to methods of using substituted indole compounds and optionally one or more estrogens in the inducement of sphincter continence or competence or in the treatment, prevention, inhibition or alleviation of sphincter incontinence.

### **Background of the Invention**

10

Stress incontinence is a problem in which the urethral sphincter is unable to retain urine in the bladder. Such problems may occur as a result from weakened pelvic muscles that support the bladder, or malfunction of the urethral sphincter. Trauma to the urethral area, neurological injury, and some medications may weaken the urethral closure. Male sphincter weakness can occur after prostate surgery. Women may experience similar weakness after pelvic surgery. Women may also experience stress incontinence after multiple pregnancies, pelvic prolapse (protrusion of the bladder or urethra into the vaginal space), cystocele, or rectocele. Additionally, women with low estrogen levels may experience stress incontinence due to decreased vaginal muscle tone. Studies have documented that about 50% of all women have occasional incontinence, and as many as 10% have regular incontinence. In women over 75 years of age, nearly 20% experience incontinence daily. The risk increases with advancing age, obesity, chronic bronchitis, asthma, and childbearing.

15  
20

25

Lack of control of the lower esophageal sphincter can lead to stomach acids being refluxed upward into the esophagus, causing heartburn, also known as gastroesophageal reflux disease (GERD), reflux or reflux esophagitis. This condition is often due to failure of the lower esophageal sphincter to close properly. In milder forms, the sufferers experience a burning sensation in the esophagus or heartburn which often leads to pain, lack of sleep, and loss of productivity. Chronic reflux can lead to esophageal ulceration requiring surgery is thought to be possibly contributory to development of esophageal cancer.

30

- 2 -

Sphincters composed of smooth muscle cells are controlled predominantly by the autonomic nervous system in relation to the conditions in the luminal areas on either side of the sphincter, e.g., food passing through the esophagus triggers the lower esophageal sphincter to relax or open to the stomach, or bladder pressure  
5 signals the sphincter opening of the posterior urethra.

Sphincters generally remain closed or contracted in relation to their luminal structures and inhibit flow of materials. Sphincters fail and allow untimely passage of materials for various reasons, including passage obstructions, trauma to the passage,  
10 improper nervous system regulation, or loss of muscle tone, often found in aging or with the loss of homeostatic hormone balance.

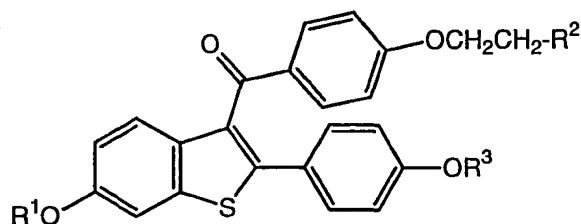
Estrogen hormone replacement therapy (HRT) has been used for the chronic treatment of urinary incontinence in post-menopausal women. However, poor patient  
15 compliance has been noted with HRT because of negative side-effects, such as increased risk of uterine cancer with un-opposed estrogen, negative CNS effects when estrogen is combined with progestins, bloating, re-initiation of menses, increased breast cancer risk, etc. Estrogens are also not usually used in men. Therefore, there is a need for better therapies to urinary incontinence in both sexes, especially in the  
20 aged.

Fecal incontinence also occurs in the elderly, though with less frequency than urinary incontinence, with post-menopausal women being the most common sufferers. Common management methods include use of absorbent undergarments,  
25 frequent changes of clothing, and increased bathing.

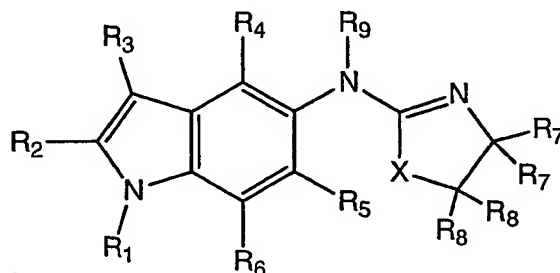
WO 99/33454 (Fabiano et al.) teaches a method of treating urinary incontinence using enantiomerically enriched (S)-procyclidine.

- 3 -

WO 97/26876 (Cullinan) teaches methods of increasing sphincter competence using raloxifene or its analogs, having the general structure:

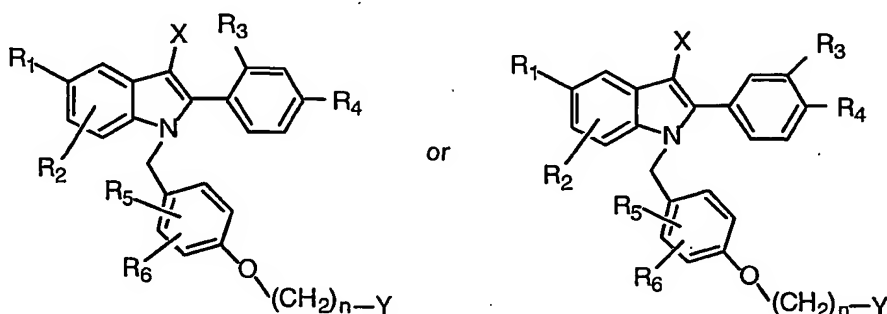


- 5 U.S. Patent No. 5,948,804 (Jeon et al.) teaches the use of substituted indole compounds having the general structure:



in the treatment of urinary incontinence.

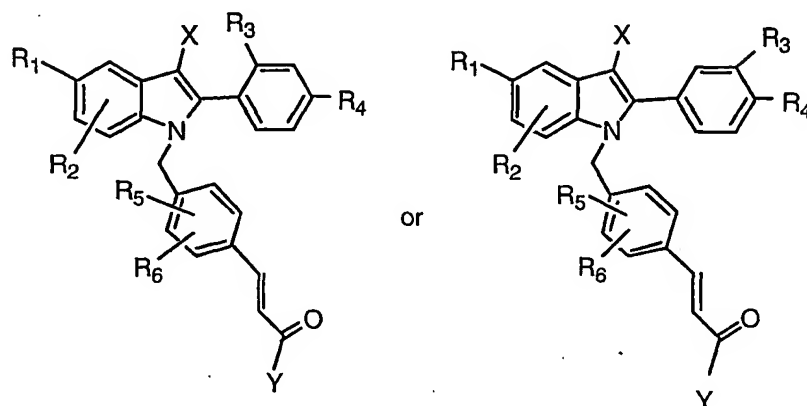
- 10 EP 0 802 183 A1 and U.S. Patent No. 5,780,497 describe substituted indole compounds of the formulae below:



- as well as their use as estrogenic agents, including the treatment of bone loss, cardiovascular disease, maladies associated with or resulting from the proliferation or abnormal development of endometrial or endometrial-like tissues, and disease states or syndromes associated with estrogen deficiency.
- 15

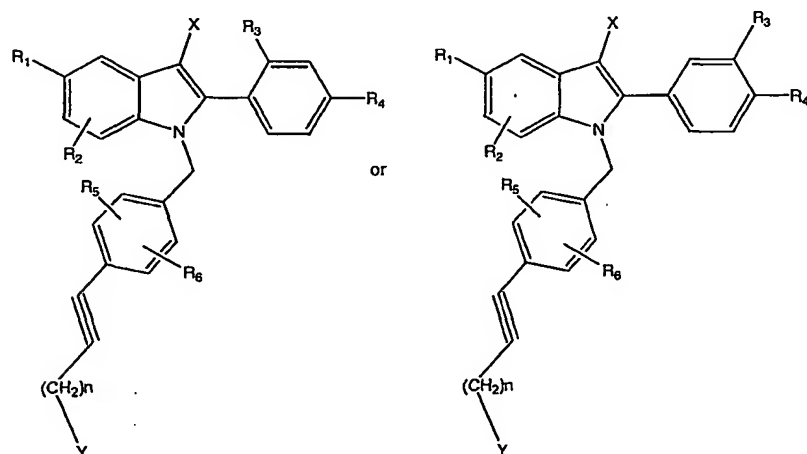
- 4 -

EP 0 802 184 A1, published October 22, 1997, describes comparable uses for substituted indole compounds of the formulae below.



5

Analogous indole compounds having the general structures:



are described in U.S. Patent No. 5,880,137 (Miller et al.).

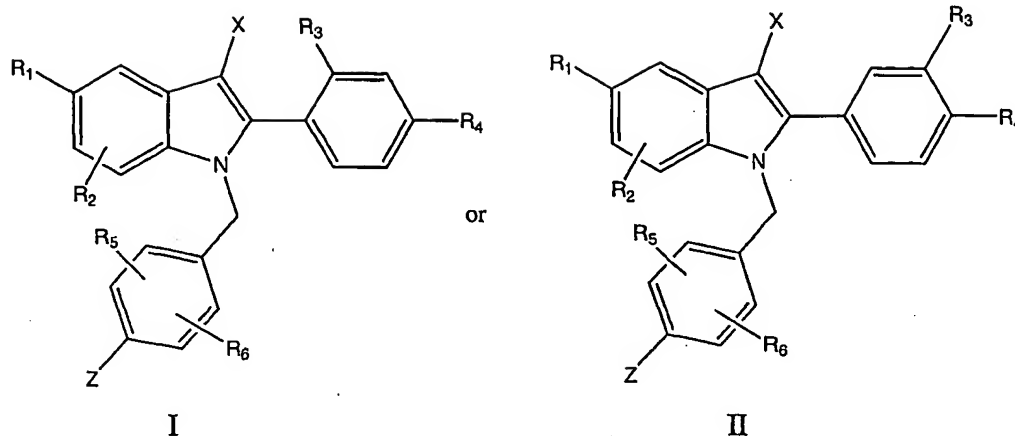
10

### Description of the Invention

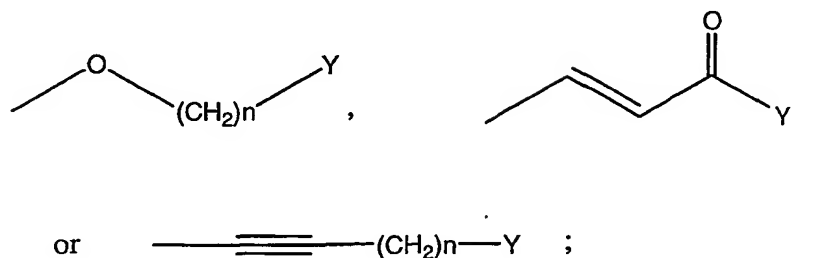
This invention comprises methods of treating, preventing, alleviating or inhibiting sphincter incontinence in a mammal, preferably in a human, the methods comprising administering to a mammal in need thereof a pharmaceutically effective amount of a compound of the formulae I or II, below:

15

- 5 -



wherein Z is a moiety selected from the group of:



5 wherein:

$R_1$  is selected from H, OH or the  $C_1$ - $C_{12}$  esters (straight chain or branched) or  $C_1$ - $C_{12}$  (straight chain or branched or cyclic) alkyl ethers thereof, benzyloxy, or halogen; or  $C_1$ - $C_4$  halogenated ethers including trifluoromethyl ether and trichloromethyl ether;

10  $R_2$ ,  $R_3$ ,  $R_5$ , and  $R_6$  are independently selected from H, OH or the  $C_1$ - $C_{12}$  esters (straight chain or branched) or  $C_1$ - $C_{12}$  alkyl ethers (straight chain or branched or cyclic) thereof, halogens, or  $C_1$ - $C_4$  halogenated ethers including trifluoromethyl ether and trichloromethyl ether, cyano,  $C_1$ - $C_6$  alkyl (straight chain or branched), or trifluoromethyl, with the proviso that, when  $R_1$  is H,  $R_2$  is not OH

15  $R_4$  is selected from H, OH or the  $C_1$ - $C_{12}$  esters (straight chain or branched) or  $C_1$ - $C_{12}$  alkyl ethers (straight chain or branched or cyclic) thereof, benzyloxy, halogens, or  $C_1$ - $C_4$  halogenated ethers including trifluoromethyl ether and trichloromethyl ether, cyano,  $C_1$ - $C_6$  alkyl (straight chain or branched), or trifluoromethyl;

X is selected from H,  $C_1$ - $C_6$  alkyl, cyano, nitro, trifluoromethyl, halogen;

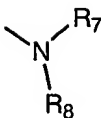
20

n is 1, 2 or 3;

- 6 -

Y is selected from:

a) the moiety:



wherein R<sub>7</sub> and R<sub>8</sub> are independently selected from the group of H, C<sub>1</sub>-C<sub>6</sub> alkyl, or phenyl optionally substituted by CN, C<sub>1</sub>-C<sub>6</sub> alkyl (straight chain or branched), C<sub>1</sub>-C<sub>6</sub> alkoxy (straight chain or branched), halogen, -OH, -CF<sub>3</sub>, or -OCF<sub>3</sub>; or R<sub>7</sub> and R<sub>8</sub> are combined by -(CH<sub>2</sub>)<sub>p</sub>-, wherein p is an integer of from 2 to 6, so as to form a ring, the ring being optionally substituted by up to three substituents selected from the group of hydroxyl, halo, C<sub>1</sub>-C<sub>4</sub>alkyl, trihalomethyl, C<sub>1</sub>-C<sub>4</sub>alkoxy, trihalomethoxy, C<sub>1</sub>-C<sub>4</sub>alkylthio, C<sub>1</sub>-C<sub>4</sub>alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub>alkylsulfonyl, hydroxy(C<sub>1</sub>-C<sub>4</sub>)alkyl, -CO<sub>2</sub>H, -CN, -CONH(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NH<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub>alkylamino, di-(C<sub>1</sub>-C<sub>4</sub>)alkylamino, -NHSO<sub>2</sub>(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHCO(C<sub>1</sub>-C<sub>4</sub>)alkyl and -NO<sub>2</sub>;

b) a five-membered saturated, unsaturated or partially unsaturated heterocycle containing up to two heteroatoms selected from the group consisting of -O-, -NH-, -N(C<sub>1</sub>C<sub>4</sub> alkyl)-, -N=, and -S(O)<sub>m</sub>-, wherein m is an integer of from 0-2, optionally substituted with 1-3 substituents independently selected from the group consisting of hydrogen, hydroxyl, halo, C<sub>1</sub>-C<sub>4</sub> alkyl, trihalomethyl, C<sub>1</sub>-C<sub>4</sub> alkoxy, trihalomethoxy, C<sub>1</sub>-C<sub>4</sub>acyloxy, C<sub>1</sub>-C<sub>4</sub>alkylthio, C<sub>1</sub>-C<sub>4</sub>alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub>alkylsulfonyl, hydroxy(C<sub>1</sub>-C<sub>4</sub>)alkyl, -CO<sub>2</sub>H-, -CN, -CONHR<sub>1</sub>, -NH<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub>alkylamino, di(C<sub>1</sub>-C<sub>4</sub>)alkylamino, -NHSO<sub>2</sub>R<sub>1</sub>, -NHCOR<sub>1</sub>, -CONH(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHSO<sub>2</sub>(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHCO(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NO<sub>2</sub>, and phenyl optionally substituted with 1-3 (C<sub>1</sub>-C<sub>4</sub>)alkyl;

c) a six-membered saturated, unsaturated or partially unsaturated heterocycle containing up to two heteroatoms selected from the group consisting of -O-, -NH-, -N(C<sub>1</sub>-C<sub>4</sub> alkyl)-, -N=, and -S(O)<sub>m</sub>-, wherein m is an integer of from 0-2, optionally substituted with 1-3 substituents independently selected from the group consisting of hydrogen, hydroxyl, halo, C<sub>1</sub>-C<sub>4</sub>alkyl, trihalomethyl, C<sub>1</sub>-C<sub>4</sub>alkoxy, trihalomethoxy, C<sub>1</sub>-C<sub>4</sub>acyloxy, C<sub>1</sub>-C<sub>4</sub>alkylthio, C<sub>1</sub>-C<sub>4</sub>alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub>alkylsulfonyl, hydroxy(C<sub>1</sub>-C<sub>4</sub>)alkyl, -CO<sub>2</sub>H, -CN-,



- 7 -

-CONHR<sub>1</sub>, -NH<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub>alkylamino, di(C<sub>1</sub>-C<sub>4</sub>)alkylamino, -NHSO<sub>2</sub>R<sub>1</sub>,  
 -NHCOR<sub>1</sub>, -CONH(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHSO<sub>2</sub>(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHCO(C<sub>1</sub>-C<sub>4</sub>)alkyl,  
 -NO<sub>2</sub>, and phenyl optionally substituted with 1-3 (C<sub>1</sub>-C<sub>4</sub>)alkyl;

5 d) a seven-membered saturated, unsaturated or partially unsaturated  
 heterocycle containing up to two heteroatoms selected from the group  
 consisting of -O-, -NH-, -N(C<sub>1</sub>-C<sub>4</sub> alkyl)-, -N=, and -S(O)<sub>m</sub>-, wherein m is an  
 integer of from 0-2, optionally substituted with 1-3 substituents independently  
 selected from the group consisting of hydrogen, hydroxyl, halo, C<sub>1</sub>-C<sub>4</sub> alkyl,  
 10 trihalomethyl, C<sub>1</sub>-C<sub>4</sub> alkoxy, trihalomethoxy, C<sub>1</sub>-C<sub>4</sub>acyloxy, C<sub>1</sub>-C<sub>4</sub>alkylthio,  
 C<sub>1</sub>-C<sub>4</sub>alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub>alkylsulfonyl, hydroxy(C<sub>1</sub>-C<sub>4</sub>)alkyl, -CO<sub>2</sub>H, -CN,  
 -CONHR<sub>1</sub>, -NH<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub>alkylamino, di(C<sub>1</sub>-C<sub>4</sub>)alkylamino, -NHSO<sub>2</sub>R<sub>1</sub>,  
 -NHCOR<sub>1</sub>, -CONH(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHSO<sub>2</sub>(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHCO(C<sub>1</sub>-C<sub>4</sub>)alkyl,  
 -NO<sub>2</sub>, and phenyl optionally substituted with 1-3 (C<sub>1</sub>-C<sub>4</sub>)alkyl; or

15 e) a bicyclic heterocycle containing from 6-12 carbon atoms either  
 bridged or fused and containing up to two heteroatoms selected from the  
 group consisting of -O-, -NH-, -N(C<sub>1</sub>-C<sub>4</sub> alkyl)-, and -S(O)<sub>m</sub>-, wherein m is an  
 integer of from 0-2, optionally substituted with 1-3 substituents independently  
 selected from the group consisting of hydrogen, hydroxyl, halo, C<sub>1</sub>-C<sub>4</sub> alkyl,  
 20 trihalomethyl, C<sub>1</sub>-C<sub>4</sub>alkoxy, trihalomethoxy, C<sub>1</sub>-C<sub>4</sub>acyloxy, C<sub>1</sub>-C<sub>4</sub>alkylthio,  
 C<sub>1</sub>-C<sub>4</sub>alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub>alkylsulfonyl, hydroxy(C<sub>1</sub>-C<sub>4</sub>)alkyl, -CO<sub>2</sub>H-, -CN,  
 -CONHR<sub>1</sub>, -NH<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub>alkylamino, di(C<sub>1</sub>-C<sub>4</sub>)alkylamino, -NHSO<sub>2</sub>R<sub>1</sub>,  
 -NHCOR<sub>1</sub>, -CONH(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHSO<sub>2</sub>(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHCO(C<sub>1</sub>-C<sub>4</sub>)alkyl,  
 25 -NO<sub>2</sub>, and phenyl optionally substituted with 1-3 (C<sub>1</sub>-C<sub>4</sub>) alkyl;

and the pharmaceutically acceptable salts thereof, and one or more estrogens, or a  
 pharmaceutically acceptable salt thereof.

The more preferred compounds of this invention are those having the general  
 30 structures I or II, above, wherein:

R<sub>1</sub> is selected from H, OH or the C<sub>1</sub>-C<sub>12</sub> esters or alkyl ethers thereof,  
 halogen;

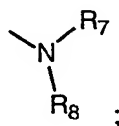
- 8 -

$R_2$ ,  $R_3$ ,  $R_5$ , and  $R_6$  are independently selected from H, OH or the  $C_1$ - $C_{12}$  esters or alkyl ethers thereof, halogen, cyano,  $C_1$ - $C_6$  alkyl, or trihalomethyl, preferably trifluoromethyl, with the proviso that, when  $R_1$  is H,  $R_2$  is not OH;

$R_4$  is selected from H, OH or the  $C_1$ - $C_{12}$  esters or alkyl ethers thereof,  
 5 benzyloxy, halogen, cyano,  $C_1$ - $C_6$  alkyl, or trihalomethyl;

X is selected from H,  $C_1$ - $C_6$  alkyl, cyano, nitro, trifluoromethyl, halogen;

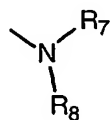
Y is the moiety



$R_7$  and  $R_8$  are selected independently from H,  $C_1$ - $C_6$  alkyl, or combined by  
 10  $-(CH_2)_p-$ , wherein p is an integer of from 2 to 6, so as to form a ring, the ring being optionally substituted by up to three substituents selected from the group of hydrogen, hydroxyl, halo,  $C_1$ - $C_4$  alkyl, trihalomethyl,  $C_1$ - $C_4$  alkoxy, trihalomethoxy,  $C_1$ - $C_4$  alkylthio,  $C_1$ - $C_4$  alkylsulfinyl,  $C_1$ - $C_4$  alkylsulfonyl, hydroxy ( $C_1$ - $C_4$ )alkyl,  $-CO_2H$ ,  $-CN$ ,  $-CONH(C_1-C_4)alkyl$ ,  $-NH_2$ ,  $C_1$ - $C_4$  alkylamino, di- $(C_1-C_4)alkylamino$ ,  
 15  $-NHSO_2(C_1-C_4)alkyl$ ,  $-NHCO(C_1-C_4)alkyl$ , and  $-NO_2$ ;  
 and the pharmaceutically acceptable salts thereof.

The rings formed by a concatenated  $R_7$  and  $R_8$ , mentioned above, may include, but are not limited to, aziridine, azetidine, pyrrolidine, piperidine,  
 20 hexamethylethylamine or heptamethylethylamine rings.

The most preferred compounds of the present invention are those having the structural formulas I or II, above, wherein  $R_1$  is OH;  $R_2$  -  $R_6$  are as defined above; X is selected from the group of Cl,  $NO_2$ , CN,  $CF_3$ , or  $CH_3$ ; and Y is the moiety



25

and  $R_7$  and  $R_8$  are concatenated together as  $-(CH_2)_r-$ , wherein r is an integer of from 4 to 6, to form a ring optionally substituted by up to three substituents selected from the group of hydrogen, hydroxyl, halo,  $C_1$ - $C_4$  alkyl, trihalomethyl,  $C_1$ - $C_4$  alkoxy, trihalomethoxy,  $C_1$ - $C_4$  alkylthio,  $C_1$ - $C_4$  alkylsulfinyl,  $C_1$ - $C_4$  alkylsulfonyl, hydroxy

- 9 -

(C<sub>1</sub>-C<sub>4</sub>)alkyl, -CO<sub>2</sub>H, -CN, -CONH(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NH<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub>alkylamino, di(C<sub>1</sub>-C<sub>4</sub>)alkylamino, -NHSO<sub>2</sub>(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHCO(C<sub>1</sub>-C<sub>4</sub>)alkyl, and -NO<sub>2</sub>; and the pharmaceutically acceptable salts thereof.

5           In another embodiment of this invention, when R<sub>7</sub> and R<sub>8</sub> are concatenated together as -(CH<sub>2</sub>)<sub>p</sub>-, wherein p is an integer of from 2 to 6, preferably 4 to 6, the ring so formed is optionally substituted with 1-3 substituents selected from a group containing C<sub>1</sub>-C<sub>3</sub> alkyl, trifluoromethyl, halogen, hydrogen, phenyl, nitro, -CN.

10           Among the preferred compounds for use as active ingredients in the formulations and methods of this invention are 1-[4-(2-Azepan-1-yl-ethoxy)-benzyl]-2-(4-hydroxy-phenyl)-3-methyl-1H-indol-5-ol, also known as TSE-424, and 2-(4-Hydroxy-phenyl)-3-methyl-1-(4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indol-5-ol, also known as ERA-923, as well as pharmaceutically acceptable salt forms of these  
15           compounds.

          The methods of this invention provide assistance in sphincter continence, competence or control, particularly including those of the anus and bladder, the methods comprising administering to a mammal in need thereof a pharmaceutically  
20           effective amount of a compound of the groups described herein. Urinary sphincter control induced by this invention allows the individual to maintain urinary bladder continence or control and to prevent, inhibit or control urge incontinence and stress incontinence.

25           The methods of this invention can also be used to maintain, increase or induce control, continence or competence of the lower esophageal sphincter. This inhibits acids from being refluxed upward into the esophagus, causing heartburn. This action may also be characterized as a method for inhibiting, alleviating or preventing undesired reflux of materials from the stomach through the lower esophageal  
30           sphincter back into the esophagus, resulting in the conditions known as heartburn, reflux or reflux esophagitis.

- 10 -

The methods of this invention further allow a recipient to maintain or induce anal sphincter control, continence or competence and inhibit, alleviate, or limit the incidence of fecal incontinence.

5        These methods each comprise administering to a mammal in need thereof a pharmaceutically effective amount of one of the substituted indoles taught herein and optionally a pharmaceutically effective amount of one or more estrogens. These administrations may be therapeutic or prophylactic. Among the preferred substituted indole compounds for use in these methods are 1-[4-(2-azepan-1-yl-ethoxy)-benzyl]-2-  
10 (4-hydroxy-phenyl)-3-methyl-1H-indol-5-ol, also known as TSE-424, and 2-(4-hydroxy-phenyl)-3-methyl-1-(4-(2-piperidin-1-yl-ethoxy)-benzyl)-1H-indol-5-ol, also known as ERA-923.

Estrogens useful in the formulations of this invention include estrone, estriol,  
15 equilin, estradiene, equilenin, ethinyl estradiol, 17 $\beta$ -estradiol, 17 $\alpha$ -dihydroequilenin, 17 $\beta$ -dihydroequilenin (U.S. Patent 2,834,712), 17 $\alpha$ -dihydroequilin, 17 $\beta$ -dihydroequilin, menstranol and conjugated estrogenic hormones, such as those in Wyeth-Ayerst Laboratories' Premarin<sup>®</sup> products (P.O. Box 8299, Philadelphia, PA 19101, U.S.A.). Phytoestrogens, such as equol or enterolactone, may also be used in the  
20 present formulations and methods. A preferred embodiment of this invention comprises pharmaceutical compositions and methods of treatment utilizing conjugated estrogenic hormones, such as those in Wyeth-Ayerst Laboratories' Premarin<sup>®</sup> products, with one or more compounds of Formulas (I) or (III) listed herein. Esterified estrogens, such as those sold by Solvay Pharmaceuticals, Inc. under  
25 the Estratab<sup>®</sup> tradename, may also be used with the present formulations. Also preferred for use with the present invention are the salts of the applicable estrogens, most preferably the sodium salts. Examples of these preferred salts are Sodium estrone sulfate, Sodium equilin sulfate, Sodium 17 $\alpha$ -dihydroequilin sulfate, Sodium 17 $\alpha$ -estradiol sulfate, Sodium Delta8,9- dehydroestrone sulfate, Sodium  
30 equilenin sulfate, Sodium 17 $\beta$ -dihydroequilin sulfate, Sodium 17 $\alpha$ -dihydroequilenin sulfate, Sodium 17 $\beta$ -estradiol sulfate, Sodium 17 $\beta$ -dihydroequilenin sulfate, Estrone 3-sodium sulfate, Equilin 3-sodium sulfate,

- 11 -

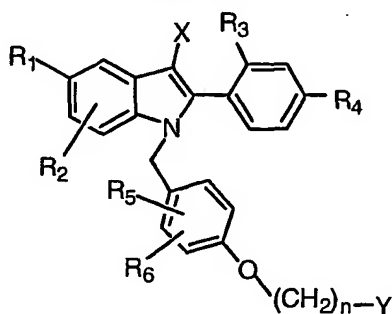
17alpha-Dihydroequilin 3-sodium sulfate, 3beta-Hydroxy-estra-5(10),7-dien-17-one 3-sodium sulfate, 5alpha-Pregnan-3beta-20R-diol 20-sodium sulfate, 5alpha-Pregnan-3beta,16alpha-diol-20-one 3-sodium sulfate, delta(8,9)-Dehydroestrone 3-sodium sulfate, Estra-3beta, 17alpha-diol 3-sodium sulfate, 3beta-Hydroxy-estr-5(10)-en-17-one 3-sodium sulfate or 5alpha-Pregnan-3beta,16alpha,20R-triol 3-sodium sulfate. Preferred salts of estrone include, but are not limited to, the sodium and piperate salts. Among the most preferred estrogens for use with this invention are the conjugated estrogens of the Premarin® brand products.

10 When an estrogen is present among the most preferred embodiments of this invention are methods combining the administration in a mammal of pharmaceutically effective amounts of:

- a) a substituted indole compound selected from 1-[4-(2-azepan-1yl-ethoxy)-benzyl]-2-(4-hydroxy-phenyl)-3-methyl-1H-indol-5-ol, also known as TSE-424, and 2-(4-hydroxy-phenyl)-3-methyl-1-(4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indol-5-ol, also known as ERA-923, or a pharmaceutically acceptable salt of TSE-424 or ERA-923; and
- b) the conjugated estrogenic hormones, such as those of the Premarin® brand products marketed by Wyeth-Ayerst Laboratories.

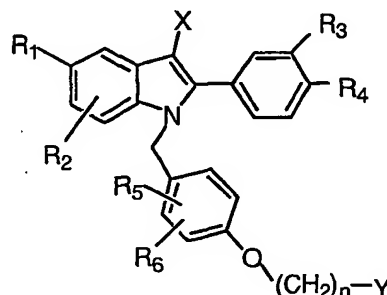
20

The present invention includes methods utilizing a first subset or subgroup of compounds of the formulas III or IV, below:



(III)

or



(IV)

25 wherein the variable substituents including R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, n, X, and Y are as defined above, or a pharmaceutically acceptable salt thereof.

- 12 -

The more preferred compounds of this first subset of compounds are those having the general structures III or IV, above, wherein:

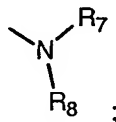
$R_1$  is selected from H, OH or the  $C_1$ - $C_{12}$  esters or alkyl ethers thereof, benzyloxy, or halogen;

5  $R_2$ ,  $R_3$ ,  $R_5$ , and  $R_6$  are independently selected from H, OH or the  $C_1$ - $C_{12}$  esters or alkyl ethers thereof, halogen, cyano,  $C_1$ - $C_6$  alkyl, or trihalomethyl, preferably trifluoromethyl, with the proviso that, when  $R_1$  is H,  $R_2$  is not OH;

$R_4$  is selected from H, OH or the  $C_1$ - $C_{12}$  esters or alkyl ethers thereof, benzyloxy, halogen, cyano,  $C_1$ - $C_6$  alkyl, or trihalomethyl;

10 X is selected from H,  $C_1$ - $C_6$  alkyl, cyano, nitro, trifluoromethyl, halogen;

Y is the moiety



$R_7$  and  $R_8$  are selected independently from H,  $C_1$ - $C_6$  alkyl, or combined by  $-(CH_2)_p$ -, wherein p is an integer of from 2 to 6, so as to form a ring, the ring being  
 15 optionally substituted by up to three substituents selected from the group of hydrogen, hydroxyl, halo,  $C_1$ - $C_4$  alkyl, trihalomethyl,  $C_1$ - $C_4$  alkoxy, trihalomethoxy,  $C_1$ - $C_4$  alkylthio,  $C_1$ - $C_4$  alkylsulfinyl,  $C_1$ - $C_4$  alkylsulfonyl, hydroxy ( $C_1$ - $C_4$ )alkyl,  $-CO_2H$ ,  $-CN$ ,  $-CONH(C_1-C_4)$ ,  $-NH_3$ ,  $C_1$ - $C_4$  alkylamino,  $C_1$ - $C_4$  dialkylamino,  $-NHSO_2(C_1-C_4)$ ,  $-NHCO(C_1-C_4)$ , and  $-NO_3$ ;

20 and the pharmaceutically acceptable salts thereof.

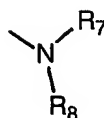
The rings formed by a concatenated  $R_7$  and  $R_8$ , mentioned above, may include, but are not limited to, aziridine, azetidine, pyrrolidine, piperidine, hexamethylenamine or heptamethylenamine rings.

25

The most preferred compounds of this first subset of compounds are those having the structural formulas I or II, above, wherein  $R_1$  is OH;  $R_2$  -  $R_6$  are as defined

- 13 -

above; X is selected from the group of Cl, NO<sub>2</sub>, CN, CF<sub>3</sub>, or CH<sub>3</sub>; and Y is the moiety



and R<sub>7</sub> and R<sub>8</sub> are concatenated together as -(CH<sub>2</sub>)<sub>r</sub>, wherein r is an integer of from 4  
 5 to 6, to form a ring optionally substituted by up to three substituents selected from the  
 group of hydrogen, hydroxyl, halo, C<sub>1</sub>-C<sub>4</sub> alkyl, trihalomethyl, C<sub>1</sub>-C<sub>4</sub> alkoxy,  
 trihalomethoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, hydroxy  
 (C<sub>1</sub>-C<sub>4</sub>)alkyl, -CO<sub>2</sub>H, -CN, -CONH(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NH<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub> alkylamino, di(C<sub>1</sub>-  
 C<sub>4</sub>)alkylamino, -NHSO<sub>2</sub>(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHCO(C<sub>1</sub>-C<sub>4</sub>)alkyl, and -NO<sub>2</sub>;  
 10 and the pharmaceutically acceptable salts thereof.

In another embodiment of this first subset of compounds, when R<sub>7</sub> and R<sub>8</sub> are  
 concatenated together as -(CH<sub>2</sub>)<sub>p</sub>, wherein p is an integer of from 2 to 6, preferably 4  
 to 6, the ring so formed is optionally substituted with 1-3 substituents selected from a  
 15 group containing C<sub>1</sub>-C<sub>3</sub> alkyl, trifluoromethyl, halogen, hydrogen, phenyl, nitro, -CN.

Among the preferred compounds of this first subset of compounds are the  
 following:

- 5-Benzyloxy-2-(4-ethoxy-phenyl)-3-methyl-1-[4-(2-piperidin-1-yl-ethoxy)-  
 20 benzyl]-1H-indole;
- 5-Benzyloxy-2-phenyl-3-methyl-1-[4-(2-azepan-1-yl-ethoxy)-benzyl]-1H-  
 indole;
- 5-Benzyloxy-2-(4-benzyloxy-phenyl)-3-methyl-1-[4-(2-azepan-1-yl-ethoxy)-  
 benzyl]-1H-indole;
- 25 5-Benzyloxy-2-(4-benzyloxy-phenyl)-3-methyl-1-[4-(2-diisopropylamino-1-  
 yl-ethoxy)-benzyl]-1H-indole;
- 5-Benzyloxy-2-(4-benzyloxy-phenyl)-3-methyl-1-[4-(2-butyl-methylamino-1-  
 ylethoxy)-benzyl]-1H-indole;
- 5-Benzyloxy-2-(4-benzyloxy-phenyl)-3-methyl-1-[4-(2-dimethylamino)ethoxy]-  
 30 benzyl]-1H-indole;

- 14 -

5-Benzyloxy-2-(4-benzyloxy-phenyl)-3-methyl-1-{4-[2-(2-methyl-piperidin-1-yl)-ethoxy]-benzyl}-1H-indole;

5-Benzyloxy-2-(4-benzyloxy-phenyl)-3-methyl-1-{4-[2-(3-methyl-piperidin-1-yl)-ethoxy]-benzyl}-1H-indole;

5 5-Benzyloxy-2-(4-benzyloxy-phenyl)-3-methyl-1-{4-[2-(4-methyl-piperidin-1-yl)-ethoxy]-benzyl}-1H-indole;

5-Benzyloxy-2-(4-benzyloxy-phenyl)-3-methyl-1{4-[2-((cis)-2,6-dimethyl-piperidin-1-yl)-ethoxy]-benzyl}-1H-indole;

5-Benzyloxy-2-(4-benzyloxy-phenyl)-3-methyl-{4-[2-(1,3,3-trimethyl-6-azabicyclo[3.2.1]oct-6-yl)-ethoxy]-benzyl}-1H-indole;

(1S,4R)-5-Benzyloxy-2-(4-benzyloxy-phenyl)-3-methyl{4-[2-(2-Aza-bicyclo[2.2.1] hept-2-yl)-ethoxy]-benzyl}-1H-indole;

5-Benzyloxy-2-(4-fluoro-phenyl)-3-methyl-1-[4-(2-azepan-1-yl-ethoxy)-benzyl]-1H-indole;

15 5-Benzyloxy-2-(4-fluoro-phenyl)-3-methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indole;

5-Benzyloxy-2-(4-chloro-phenyl)-3-methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indole;

5-Benzyloxy-2-[3,4-methylenedioxy-phenyl]-3-methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indole;

5-Benzyloxy-2-[4-isopropoxy-phenyl]-3-methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indole;

5-Benzyloxy-2-[4-methyl-phenyl]-3-methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indole;

25 1-[4-(2-Azepan-1-yl-ethoxy)-benzyl]-5-benzyloxy-2-(3-benzyloxy-phenyl)-3-methyl-1H-indole;

5-Benzyloxy-2-(4-benzyloxy-3-fluoro-phenyl)-3-methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indole;

5-Benzyloxy-2-(4-benzyloxy-3-fluoro-phenyl)-3-methyl-1-[4-(2-azepan-1-yl-ethoxy)-benzyl]-1H-indole;

30 5-Benzyloxy-2-(3-methoxy-phenyl)-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-3-methyl-1H-indole;



- 15 -

- 5-Benzyloxy-3-methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-2-(4-trifluoromethoxy-phenyl)-1H-indole;
- (2-{4-[5-Benzyloxy-2-(4-benzyloxy-phenyl)-3-methyl-indol-1-ylmethyl]-phenoxy}-ethyl)-cyclohexyl-amine;
- 5 5-Benzyloxy-2-(4-benzyloxy-phenyl)-3-methyl-1-{4-methylpiperazin-1-yl}-ethoxy]-benzyl}-1H-indole;
- 1-[4-(2-Azepan-1-yl-ethoxy)-benzyl]-5-benzyloxy-2-(3-methoxy-phenyl)-3-methyl-1H-indole;
- 4-{3-Methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indole};
- 10 4-{3-Methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indol-2-yl}-phenol;
- 3-Methyl-2-phenyl-1-[4-(2-piperidine-1-yl-ethoxy)-benzyl]-1H-indol-5-ol;
- 4-{5-Methoxy-3-methyl-1-[4-[2-(piperidin-1-yl)-ethoxy]-benzyl]-1H-indol-2-yl}-phenol;
- 2-(4-methoxy-phenyl)-3-methyl-1-[4-[2-(piperidin-1-yl)-ethoxy]-benzyl]-1H-
- 15 indol-5-ol;
- 5-Methoxy-2-(4-methoxy-phenyl)-3-methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indole;
- 1-[4-(2-Azepan-1-yl-ethoxy)-benzyl]-5-methoxy-2-(4-methoxy-phenyl)-3-methyl-1H-indole;
- 20 2-(4-Ethoxy-phenyl)-3-methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indol-5-ol;
- 1-[4-(2-Azepan-1-yl-ethoxy)-benzyl]-2-(4-ethoxy-phenyl)-3-methyl-1H-indol-5-ol;
- 4-{5-Fluoro-3-methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indol-2-yl}-
- 25 phenol;
- 1-[4-(2-Azepan-1-yl-ethoxy)-benzyl]-3-methyl-2-phenyl-1H-indol-5-ol;
- 2-(4-Hydroxy-phenyl)-3-methyl-1-[4-(2-pyrrolidin-1-yl-ethoxy)-benzyl]-1H-indol-5-ol;
- 1-[4-(2-Azepan-1-yl-ethoxy)-benzyl]-2-(4-hydroxy-phenyl)-3-methyl-1H-
- 30 indol-5-ol;
- 1-[4-(2-Azepan-1-yl-ethoxy)-benzyl]-2-(4-hydroxy-phenyl)-3-methyl-1H-indol-5-ol;

- 1-[4-(2-Azocan-1-yl-ethoxy)-benzyl]-2-(4-hydroxy-phenyl)-3-methyl-1H-indol-5-ol;
- 2-(4-Hydroxy-phenyl)-3-methyl-1-[4-(2-dimethyl-1-yl-ethoxy)-benzyl]-1H-indol-5-ol;
- 5 2-(4-Hydroxy-phenyl)-3-methyl-1-[4-(2-diethyl-1-yl-ethoxy)-benzyl]-1H-indol-5-ol;
- 1-[4-(2-Dipropylamino-ethoxy)-benzyl]-2-(4-hydroxy-phenyl)-3-methyl-1H-indol-5-ol;
- 1-[4-(2-Dibutylamino-ethoxy)-benzyl]-2-(4-hydroxy-phenyl)-3-methyl-1H-indol-5-ol;
- 10 1-[4-(2-Diisopropylamino-ethoxy)-benzyl]-2-(4-hydroxy-phenyl)-3-methyl-1H-indol-5-ol;
- 1-[4-[2-(Butyl-methyl-amino)-ethoxy]-benzyl]-2-(4-hydroxy-phenyl)-3-methyl-1H-indol-5-ol;
- 15 2-(4-Hydroxy-phenyl)-3-methyl-1-[4-[2-(2-methyl-piperidin-1-yl)-ethoxy]-benzyl]-1H-indol-5-ol;
- 2-(4-Hydroxy-phenyl)-3-methyl-1-[4-[2-(3-methyl-piperidin-1-yl)-ethoxy]-benzyl]-1H-indol-5-ol;
- 2-(4-Hydroxy-phenyl)-3-methyl-1-[4-[2-(4-methyl-piperidin-1-yl)-ethoxy]-benzyl]-1H-indol-5-ol;
- 20 1-[4-[2-(3,3-Dimethyl-piperidin-1-yl)-ethoxy]-benzyl]-2-(4-hydroxy-phenyl)-3-methyl-1H-indol-5-ol;
- 1-[4-[2-((cis)-2,6-Dimethyl-piperidin-1-yl)-ethoxy]-benzyl]-2-(4-hydroxy-phenyl)-3-methyl-1H-indol-5-ol;
- 25 2-(4-Hydroxy-phenyl)-1-[4-[2-(4-hydroxy-piperidin-1-yl)-ethoxy]-benzyl]-3-methyl-1H-indol-5-ol;
- (1S,4R)-1-[4-[2-(2-Aza-bicyclo[2.2.1]hept-2-yl)-ethoxy]-benzyl]-2-(4-hydroxy-phenyl)-3-methyl-1H-indol-5-ol;
- 2-(4-Hydroxy-phenyl)-3-methyl-1-[4-[2-(1,3,3-trimethyl-6-aza-bicyclo-[3.2.1]oct-6-yl)-ethoxy]-benzyl]-1H-indol-5-ol;
- 30 2-(4-Fluoro-phenyl)-3-methyl-1-[4-(2-piperidine-1-yl-ethoxy)-benzyl]-1H-indol-5-ol;

- 1-[4-(2-Azepan-1-yl-ethoxy)-benzyl]-2-(4-fluoro-phenyl)-3-methyl-1H-indol-5-ol;
- 2-(3-Methoxy-4-hydroxy-phenyl)-3-methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indol-5-ol;
- 5 2-Benzo[1,3]dioxol-5-yl-3-methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indol-5-ol;
- 2-(4-Isopropoxy-phenyl)-3-methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indol-5-ol;
- 10 1-[4-(2-Azepan-1-yl-ethoxy)-benzyl]-2-(4-isopropoxy-phenyl)-3-methyl-1H-indol-5-ol;
- 2-(4-Cyclopentyloxy-phenyl)-3-methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indol-5-ol;
- 3-Methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-2-(4-trifluoromethyl-phenyl)-1H-indol-5-ol;
- 15 3-Methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-2-p-tolyl-1H-indol-5-ol;
- 2-(4-Chloro-phenyl)-3-methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indol-5-ol;
- 2-(2,4-Dimethoxy-phenyl)-3-methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indol-5-ol;
- 20 2-(3-Hydroxy-phenyl)-3-methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indol-5-ol;
- 1-[4-(2-Azepan-1-yl-ethoxy)-benzyl]-2-(3-hydroxy-phenyl)-3-methyl-1H-indole-5-ol;
- 2-(3-Fluoro-4-hydroxy-phenyl)-3-methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indol-5-ol;
- 25 2-(3-Fluoro-4-hydroxy-phenyl)-3-methyl-1-[4-(azepan-1-yl-ethoxy)-benzyl]-1H-indol-5-ol;
- 2-(3-Methoxy-phenyl)-3-methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indole-5-ol;
- 30 3-Methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-2-(4-trifluoromethoxy-phenyl)-1H-indole-5-ol;
- 3-Chloro-2-(4-hydroxy-phenyl)-1-[4-(2-pyrrolidin-1-yl-ethoxy)-benzyl]-1H-indol-5-ol;

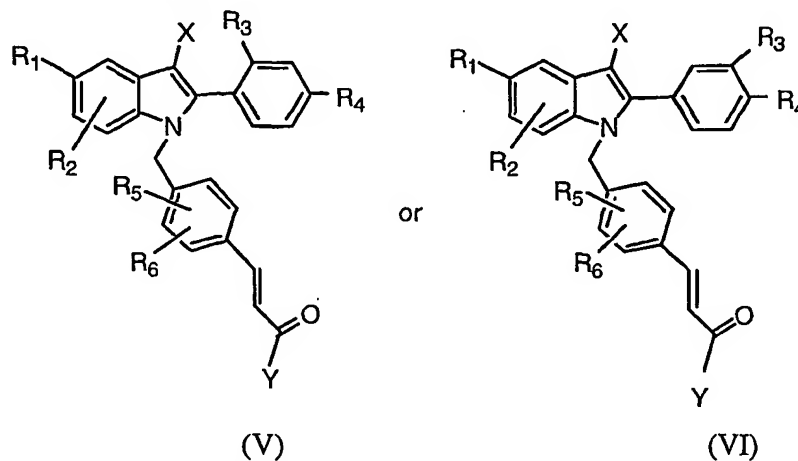
- 3-Chloro-2-(4-hydroxy-phenyl)-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indol-5-ol;
- 3-Chloro-2-(4-hydroxy-phenyl)-1-[4-(2-azepan-1-yl-ethoxy)-benzyl]-1H-indol-5-ol;
- 5 3-Chloro-2-(4-hydroxy-2-methyl-phenyl)-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indol-5-ol;
- 2-(4-Hydroxy-phenyl)-3-ethyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indol-5-ol;
- 5-Hydroxy-2-(4-Hydroxy-phenyl)-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indole-3-carbonitrile;
- 10 1-[4-(2-Azepan-1-yl-ethoxy)-benzyl]-5-hydroxy-2-(4-hydroxy-phenyl)-1H-indole-3-cabonitrile;
- 5-Benzyloxy-2-(4-benzyloxy-phenyl)-3-chloro-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indole;
- 15 5-Benzyloxy-2-(4-benzyloxy-phenyl)-3-chloro-1-[4-(2-azepan-1-yl-ethoxy)-benzyl]-1H-indole;
- 5-Benzyloxy-2-(2-methyl-4-benzyloxy-phenyl)-3-chloro-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indole;
- 5-Benzyloxy-2-(4-benzyloxy-phenyl)-3-ethyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indole;
- 20 5-Benzyloxy-2-(4-benzyloxy-phenyl)-3-cyano-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indole;
- 5-Benzyloxy-2-(4-benzyloxy-phenyl)-3-cyano-1-[4-(2-azepan-1-yl-ethoxy)-benzyl]-1H-indole;
- 25 Di-propionate of 1-[4-(2-Azepan-1-yl-ethoxy)-benzyl]-2-(4-hydroxy-phenyl)-3-methyl-1H-indol-5-ol;
- Di-pivalate of 1-[4-(2-Azepan-1-yl-ethoxy)-benzyl]-2-(4-hydroxy-phenyl)-3-methyl-1H-indol-5-ol;
- 5-Benzyloxy-2-(4-benzyloxy-phenyl)-1-[4-(3-piperidin-1-yl-propoxy)benzyl]-3-methyl-1H-indole;
- 30 2-(4-Hydroxy-phenyl)-3-methyl-1-[4-[3-(piperidin-1-yl)-propoxy]-benzyl]-1H-indol-5-ol;

2-(4-Hydroxy-phenyl)-1-[3-methoxy-4-(2-piperidin-1-yl-ethoxy)-benzyl]-3-methyl-1H-indol-5-ol;  
2-(4-Hydroxy-phenyl)-1-[3-methoxy-4-(2-azepan-1-yl-ethoxy)-benzyl]-3-methyl-1H-indol-5-ol;  
5 5-Benzyloxy-2-(4-benzyloxy-phenyl)-3-methyl-1-[3-Methoxy-4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indole;  
5-Benzyloxy-2-(4-benzyloxy-phenyl)-3-methyl-1-[2-Methoxy-4-(2-azepan-1-yl-ethoxy)-benzyl]-1H-indole;  
2-(4-Hydroxy-phenyl)-3-methyl-1-[4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-  
10 indol-5-ol;  
or the pharmaceutically acceptable salts thereof.

The compounds of this first subset or subgroup of compounds can be produced by the methods described in EP 0 802 183 A1, published October 22, 1997, and U.S. Patent No. 5,780,497, the subject matter of which is incorporated herein by reference, or by other methods known in the art. Aryloxy-alkyl-dialkylamines or aryloxy-alkyl-cyclic amines useful as intermediates in the production of the compounds above can be produced and used as disclosed in WO 99/19293, published April 22, 1999, the subject matter of which is also incorporated herein by reference.

20

A second subset or subgroup of compounds useful with this invention includes those of formulas (V) or (VI), below:



25 wherein the variable substituents including R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, n, X, and Y are as defined above, or a pharmaceutically acceptable salt thereof.

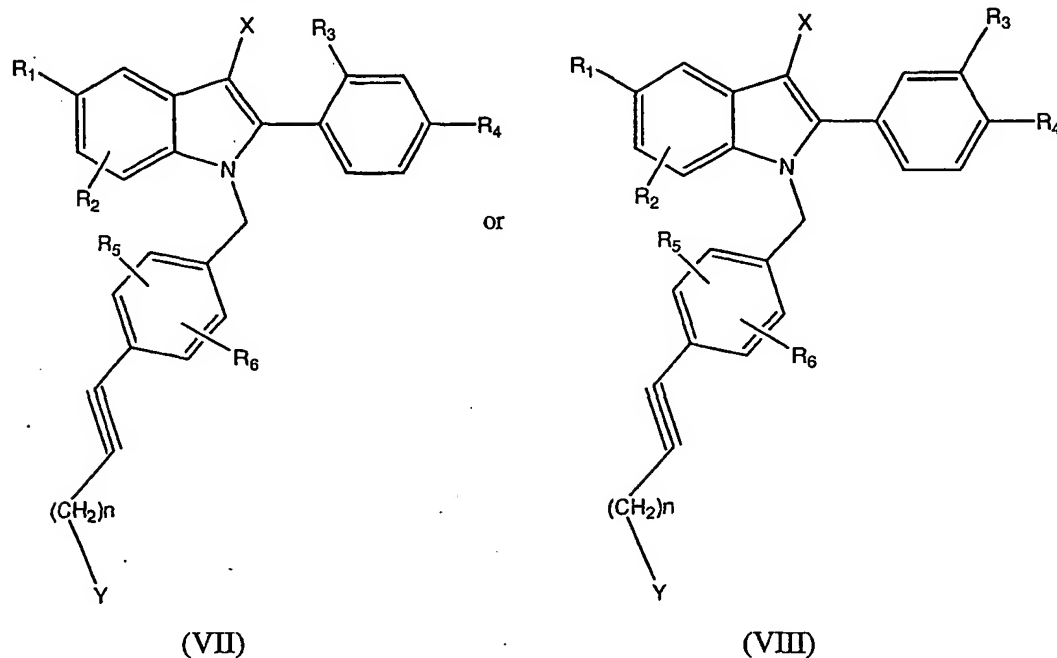
Among the preferred compounds of this second subset or subgroup are the following:

- (E)-N,N-Diethyl-3-{4-[5-hydroxy-2-(4-hydroxy-phenyl)-3-methyl-indol-1-ylmethyl]-phenyl}-acrylamide;  
5  
1(E)-N-tert-butyl-3-{4-[5-hydroxy-2-(4-hydroxy-phenyl)-3-methyl-indol-1-ylmethyl]-phenyl}-acrylamide;  
(E)-Pyrollidino-3-{4-[5-hydroxy-2-(4-hydroxy-phenyl)-3-methyl-indol-1-ylmethyl]-phenyl}-acrylamide;  
10  
(E)-N,N-Dimethyl-3-{4-[5-hydroxy-2-(4-hydroxy-phenyl)-3-methyl-indol-1-ylmethyl]-phenyl}-acrylamide;  
(E)-N,N-Dibutyl-3-{4-[5-hydroxy-2-(4-hydroxy-phenyl)-3-methyl-indol-1-ylmethyl]-phenyl}-acrylamide;  
(E)-N-Butyl,N'-methyl-3-{4-[5-hydroxy-2-(4-hydroxy-phenyl)-3-methyl-indol-1-ylmethyl]-phenyl}-acrylamide;  
15  
(E)-Morpholinino-3-{4-[5-hydroxy-2-(4-hydroxy-phenyl)-3-methyl-indol-1-ylmethyl]-phenyl}-acrylamide;  
(E)-3-{4-[5-hydroxy-2-(4-hydroxy-phenyl)-3-methyl-indol-1-ylmethyl]-phenyl}-acrylamide;  
20  
(E)-N,Methyl-3-{4-[5-hydroxy-2-(4-hydroxy-phenyl)-3-methyl-indol-1-ylmethyl]-phenyl}-acrylamide;  
(E)-N,N-Dibutyl-3-{4-[5-hydroxy-2-(4-fluoro-phenyl)-3-methyl-indol-1-ylmethyl]-phenyl}-acrylamide;  
(E)-N-Butyl,N'-Methyl-3-{4-[5-hydroxy-2-(4-fluoro-phenyl)-3-methyl-indol-1-ylmethyl]-phenyl}-acrylamide;  
25  
as well as the pharmaceutically acceptable salts and esters thereof.

The compounds of this second subset or subgroup of compounds can be produced by the methods described in EP 0 802 184 A1, published October 22, 1997,  
30 which is incorporated herein by reference, or by other methods known in the art.

- 21 -

A third subset of compounds useful with the present invention include those of the formulae VII and VIII:



- 5 wherein n is 1, 2 or 3 and the variable substituents including R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, n, X, and Y are as defined above, or a pharmaceutically acceptable salt thereof.

Among the preferred compounds of this third subset are:

- 2-(4-Hydroxy-phenyl)-3-methyl-1-[4-(3-N,N-dimethyl-1-yl-prop-1-ynyl)-  
 10 benzyl]-1H-indol-5-ol;  
 2-(4-Hydroxy-phenyl)-3-methyl-1-[4-(3-piperidin-1-yl-prop-1-ynyl)-benzyl]-  
 1H-indol-5-ol; and  
 2-(4-Hydroxy-phenyl)-3-methyl-1-[4-(3-pyrrolidin-1-yl-prop-1-ynyl)-benzyl]-  
 1H-indol-5-ol;  
 15 or pharmaceutically acceptable salts or esters thereof.

The compounds of this third subset or subgroup of compounds can be produced by the methods described in U.S. Patent No. 5,880,137 (Miller et al.), which is incorporated herein by reference, or by other methods known in the art.

- 22 -

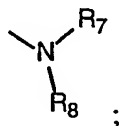
Within each of the first, second and third subsets of compounds of this invention are further subdivisions of more preferred compounds having the general structures I through VIII, above, wherein:

$R_1$  is selected from H, OH or the  $C_1$ - $C_{12}$  esters or alkyl ethers thereof,  
5 halogen;

$R_2$ ,  $R_3$ ,  $R_4$ ,  $R_5$ , and  $R_6$  are independently selected from H, OH or the  $C_1$ - $C_{12}$  esters or alkyl ethers thereof, halogen, cyano,  $C_1$ - $C_6$  alkyl, or trihalomethyl, preferably trifluoromethyl, with the proviso that, when  $R_1$  is H,  $R_2$  is not OH;

X is selected from H,  $C_1$ - $C_6$  alkyl, cyano, nitro, trifluoromethyl, halogen;

10 Y is the moiety



$R_7$  and  $R_8$  are selected independently from H,  $C_1$ - $C_6$  alkyl, or combined by  $-(CH_2)_p$ -, wherein p is an integer of from 2 to 6, so as to form a ring, the ring being optionally substituted by up to three substituents selected from the group of hydrogen,  
15 hydroxyl, halo,  $C_1$ - $C_4$ alkyl, trihalomethyl,  $C_1$ - $C_4$ alkoxy, trihalomethoxy,  $C_1$ - $C_4$ alkylthio,  $C_1$ - $C_4$ alkylsulfinyl,  $C_1$ - $C_4$ alkylsulfonyl, hydroxy ( $C_1$ - $C_4$ )alkyl,  $-CO_2H$ ,  $-CN$ ,  $-CONH(C_1-C_4)alkyl$ ,  $-NH_2$ ,  $C_1$ - $C_4$ alkylamino, di( $C_1$ - $C_4$ )alkylamino,  $-NHSO_2(C_1-C_4)alkyl$ ,  $-NHCO(C_1-C_4)alkyl$ , and  $-NO_2$ ;  
and the pharmaceutically acceptable salts thereof.

20

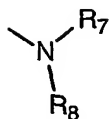
The rings formed by a concatenated  $R_7$  and  $R_8$ , mentioned above, may include, but are not limited to, aziridine, azetidine, pyrrolidine, piperidine, hexamethyleneamine or heptamethyleneamine rings.

25

The most preferred compounds of the present invention are those having the structural formulas I through VIII, above, wherein  $R_1$  is OH;  $R_2$  -  $R_6$  are as defined above; X is selected from the group of Cl,  $NO_2$ , CN,  $CF_3$ , or  $CH_3$ ; and Y is the moiety



- 23 -



and R<sub>7</sub> and R<sub>8</sub> are concatenated together as -(CH<sub>2</sub>)<sub>r</sub>-, wherein r is an integer of from 4 to 6, to form a ring optionally substituted by up to three substituents selected from the group of hydrogen, hydroxyl, halo, C<sub>1</sub>-C<sub>4</sub>alkyl, trihalomethyl, C<sub>1</sub>-C<sub>4</sub>alkoxy, trihalomethoxy, C<sub>1</sub>-C<sub>4</sub>alkylthio, C<sub>1</sub>-C<sub>4</sub>alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub>alkylsulfonyl, hydroxy (C<sub>1</sub>-C<sub>4</sub>)alkyl, -CO<sub>2</sub>H, -CN, -CONH(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NH<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub> alkylamino, di(C<sub>1</sub>-C<sub>4</sub>)alkylamino, -NHSO<sub>2</sub>(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHCO(C<sub>1</sub>-C<sub>4</sub>)alkyl, and -NO<sub>2</sub>; and the pharmaceutically acceptable salts thereof.

10 In another embodiment of this invention, when R<sub>7</sub> and R<sub>8</sub> are concatenated together as -(CH<sub>2</sub>)<sub>p</sub>-, wherein p is an integer of from 2 to 6, preferably 4 to 6, the ring so formed is optionally substituted with 1-3 substituents selected from a group containing C<sub>1</sub>-C<sub>3</sub> alkyl, trifluoromethyl, halogen, hydrogen, phenyl, nitro, -CN.

15 The invention includes sulfate, sulfamates and sulfate esters of phenolic groups. Sulfates can be readily prepared by the reaction of the free phenolic compounds with sulfur trioxide complexed with an amine such as pyridine, trimethylamine, triethylamine, etc. Sulfamates can be prepared by treating the free phenolic compound with the desired amino or alkylamino or dialkylamino sulfamyl chloride in the presence of a suitable base such as pyridine. Sulfate esters can be prepared by reaction of the free phenol with the desired alkanesulfonyl chloride in the presence of a suitable base such as pyridine. Additionally, this invention includes compounds containing phosphates at the phenol as well as dialkyl phosphates. Phosphates can be prepared by reaction of the phenol with the appropriate chlorophosphate. The dialkylphosphates can be hydrolyzed to yield the free phosphates. Phosphinates are also claimed where the phenol is reacted with the desired dialkylphosphinic chloride to yield the desired dialkylphosphinate of the phenol.

- 24 -

The invention includes acceptable salt forms formed from the addition reaction with either inorganic or organic acids. Inorganic acids such as hydrochloric acid, hydrobromic acid, hydroiodic acid, sulfuric acid, phosphoric acid, nitric acid useful as well as organic acids such as acetic acid, propionic acid, citric acid, maleic acid, malic acid, tartaric acid, phthalic acid, succinic acid, methanesulfonic acid, toluenesulfonic acid, naphthalenesulfonic acid, camphorsulfonic acid, benzenesulfonic acid are useful. It is known that compounds possessing a basic nitrogen can be complexed with many different acids (both protic and non-protic) and usually it is preferred to administer a compound of this invention in the form of an acid addition salt. Additionally, this invention includes quaternary ammonium salts of the compounds herein. These can be prepared by reacting the nucleophilic amines of the side chain with a suitably reactive alkylating agent such as an alkyl halide or benzyl halide.

It is understood that the dosage, regimen and mode of administration of these compounds will vary according to the malady and the individual being treated and will be subject to the judgement of the medical practitioner involved. It is preferred that the administration of one or more of the compounds herein begin at a low dose and be increased until the desired effects are achieved.

Effective administration of these compounds may be given at an effective dose of from about 0.1 mg/day to about 500 mg/day. Preferably, administration will be from about 1 mg/day to about 200 mg/day in a single dose or in two or more divided doses. Such doses may be administered in any manner useful in directing the active compounds herein to the recipient's bloodstream, including orally, parenterally (including intravenous, intraperitoneal and subcutaneous injections), and transdermally. For the purposes of this disclosure, transdermal administrations are understood to include all administrations across the surface of the body and the inner linings of bodily passages including epithelial and mucosal tissues. Such administrations may be carried out using the present compounds, or pharmaceutically acceptable salts thereof, in lotions, creams, foams, patches, suspensions, solutions, and suppositories (rectal and vaginal).

- 25 -

When the active ingredient in the formulations and methods of this invention is 1-[4-(2-Azepan-1-yl-ethoxy)-benzyl]-2-(4-hydroxy-phenyl)-3-methyl-1H-indol-5-ol, also known as TSE-424, or a pharmaceutically acceptable salt thereof, the preferred daily dosage for oral delivery is from about 0.1 to about 50 mg, preferably from about 2.5 to about 40 mg per day.

When the active ingredient in the formulations and methods of this invention is 2-(4-hydroxy-phenyl)-3-methyl-1-(4-(2-piperidin-1-yl-ethoxy)-benzyl)-1H-indol-5-ol, also known as ERA-923, or a pharmaceutically acceptable salt form thereof, the preferred daily dosage for oral delivery is from about 0.1 to about 200 mg, preferably from about 2.5 to about 100 mg per day.

Oral formulations containing the active compounds of this invention may comprise any conventionally used oral forms, including tablets, capsules, buccal forms, troches, lozenges and oral liquids, suspensions or solutions. Capsules may contain mixtures of the active compound(s) with inert fillers and/or diluents such as the pharmaceutically acceptable starches (e.g. corn, potato or tapioca starch), sugars, artificial sweetening agents, powdered celluloses, such as crystalline and microcrystalline celluloses, flours, gelatins, gums, etc. Useful tablet formulations may be made by conventional compression, wet granulation or dry granulation methods and utilize pharmaceutically acceptable diluents, binding agents, lubricants, disintegrants, suspending or stabilizing agents, including, but not limited to, magnesium stearate, stearic acid, talc, sodium lauryl sulfate, microcrystalline cellulose, carboxymethylcellulose calcium, polyvinylpyrrolidone, gelatin, alginic acid, acacia gum, , xanthan gum, sodium citrate, complex silicates, calcium carbonate, glycine, dextrin, sucrose, sorbitol, dicalcium phosphate, calcium sulfate, lactose, kaolin, mannitol, sodium chloride, talc, dry starches and powdered sugar. Oral formulations herein may utilize standard delay or time release formulations to alter the absorption of the active compound(s). Suppository formulations may be made from traditional materials, including cocoa butter, with or without the addition of waxes to alter the suppository's melting point, and glycerin. Water soluble suppository bases, such as polyethylene glycols of various molecular weights, may also be used.

- 26 -

When one or more estrogens is present the pharmaceutically effective doses for the estrogens and substituted indoles herein will be understood to be those sufficient to provide a desirable diminution in the risk or incidence of the sphincter incontinence  
5 in question. Preferably the compounds will be administered at a minimal dose effective to maintain or increase the sphincter continence in the recipient, as determined and directed by a medical professional.

The estrogens herein may be administered according to the regimens and  
10 doses known in the art. For instance, the preferred Premarin® conjugated estrogen tablets may be administered as described in pages 3302-3305 of the Physicians' Desk Reference, 54 Edition, 2000, Medical Economics Company, Inc., Montvale, NJ 07645-1742. Other commercially available estrogens useful with the present invention include OGEN® (estropipate tablets), ESTRATAB® (esterified estrogens  
15 tablets), ESTRACE® estradiol vaginal cream, CLIMARA® (estradiol transdermal system), ESTRADERM® (transdermal system), MENEST™ (esterified estrogens tablets), ORTHO-EST® (estropipate tablets), CENESTIN™ (synthetic conjugated estrogens), ALORA® (estradiol transdermal system), ESTINYL® (ethynil estradiol), and the VIVELLE® and VIVELLE-DOT® (estradiol transdermal systems). Each of  
20 these commercially available estrogen products can be administered as described in their relevant portions of the Physicians' Desk Reference, 54 Edition, 2000.

The following table lists estrogen replacement therapies and dosage strengths available in the United States and/or Europe.

Generic Name	Brand Name	Strength
<b>Oral estrogens</b>		
Conjugated equine estrogens (natural)	Premarin	0.3, 0.625, 0.9, 1.25, 2.5 mg
Conjugated estrogens (synthetic)	Cenestin	0.625, 0.9 mg
Esterified estrogens (75-80% estrone sulfate 6-15% equilin sulfate derived from plant sterols)	Estratab	0.3, 0.625, 1.25, 2.5 mg
Estropipate (Piperazine estrone sulfate)	Ogen Ortho-Est	0.625, 1.25, 2.5 mg
Micronized estradiol	Estrace	0.5, 1.0, 2.0 mg
Raloxifene (selective estrogen receptor modulator)	Evista	60 mg
Esterified estrogens and methylestosterone	Estratest	1.25 mg esterified estrogen and 2.5 mg methylestosterone
	Estratest HS	0.625 mg esterified estrogen and 1.25 mg methylestosterone
Estradiol valerate	Climaval	1 mg, 2 mg
Estradiol	Elleste Solo	1 mg, 2 mg
Estradiol	Estrofem	2 mg
Estradiol	Estrofem Forte	4 mg
Piperazine esterone sulfate	Harmogen	1.5 mg
Combination: Estrone	Hormonin	1.4 mg
Estradiol		0.6 mg
Estriol		0.27 mg
Estradiol valerate	Progynova	1 mg, 2 mg
Estradiol	Zumenon	1 mg, 2 mg
<b>Transdermal estrogens</b>		
Estradiol	Alora (twice weekly)	0.025, 0.0375, 0.05, 0.075,
	Climara (weekly)	0.1 mg of estradiol released
	Estraderm (2x weekly)	daily (dose options for
	Fem Patch (weekly)	various
	Vivelle (twice weekly)	products)
Estradiol	Dermestril	
Estradiol	Estraderm	25, 50, 100 µg
Estradiol	Evorel (System)	25, 50, 100 µg
Estradiol	Fematrix	25, 50, 75, 100 µg
Estradiol	Menorest	40, 80 µg
	Progynova TS	25, 37.5, 50, 75 µg
Estradiol	And TS Forte (Climara)	50, 100 µg
<b>Vaginal estrogens</b>		
Conjugated equine estrogens	Premarin vaginal cream	
Dienestrol	Ortho dienestrol cream	0.625 mg/g
Estradiol	Estring	0.1 mg/g
Estropipate	Ogen vaginal cream	7.5 µg
Micronized estradiol	Estrace vaginal cream	1.5 mg/g
		1.0 mg/g

- 28 -

The joint administration of the two groups of compounds in these methods will be determined by a medical professional based upon the condition of the recipient and the malady for which the prophylaxis or treatment is provided. For prophylaxis, such as the combination of one or more estrogens and one of the substituted indoles herein, administration of all compounds of the regimen may begin simultaneously or one may be introduced into an ongoing regimen of the other.

The joint administration of the two groups of compounds in these methods will be determined by a medical professional based upon the condition of the recipient and the malady for which the prophylaxis or treatment is provided. Administration of the two compounds may begin simultaneously or one may be introduced into an ongoing regimen of the other.

Solid oral formulations, preferably in the form of a film coated tablet or capsule, useful for this invention include the active pharmacological agent(s) disclosed herein in combination with carrier or excipient systems having the components:

a) a filler and disintegrant component comprising from about 5% to about 82% by weight (wght) of the total formulation, preferably between about 30% and about 80% of the formulation, of which from about 4% to about 40% by weight of the total formulation comprises one or more pharmaceutically acceptable disintegrants;

b) optionally, a wetting agent comprising from about 0.2 to about 5% of the composition (wght), such as selected from the group of sodium lauryl sulfate, polyoxyethylene sorbitan fatty acid esters, polyoxyethylene alkyl ethers, sorbitan fatty acid esters, polyethylene glycols, polyoxyethylene castor oil derivatives, docusate sodium, quaternary ammonium compounds, sugar esters of fatty acids and glycerides of fatty acids;

c) a lubricant comprising from about 0.2% to about 10% of the composition (wght), such as selected from the group of magnesium stearate or other metallic stearates (e.g. calcium stearate or zinc stearate), fatty acid esters (e.g. sodium stearyl fumarate), fatty acids (e.g. stearic acid), fatty alcohols, glyceryl behenate, mineral oil, paraffins, hydrogenated vegetable oils, leucine, polyethylene glycols, metallic lauryl sulfates and sodium chloride; and

- 29 -

d) optionally, a glidant comprising from about 0.1% to about 10% (wght) of the composition, the glidant selected from those known in the art, including from the group of silicon dioxide, talc, metallic stearates, calcium silicate, or metallic lauryl sulfates.

5

While the formulations described herein may be used in an uncoated or non-encapsulated solid form, preferably the final compositions are coated or encapsulated. The pharmacological compositions may be optionally coated with a film coating, preferably comprising from about 0.3% to about 8% by weight of the overall  
10 composition. Film coatings useful with the present formulations are known in the art and generally consist of a polymer (usually a cellulosic type of polymer), a colorant and a plasticizer. Additional ingredients such as wetting agents, sugars, flavors, oils and lubricants may be included in film coating formulations to impart certain characteristics to the film coat. The compositions and formulations herein may also  
15 be combined and processed as a solid, then placed in a capsule form, such as a gelatin capsule.

The filler component listed above may utilize the filler or binder components known in the art for solid oral formulations: Pharmaceutically acceptable fillers or  
20 binding agents selected from those known in the art including, but not limited to, lactose, microcrystalline cellulose, sucrose, mannitol, calcium phosphate, calcium carbonate, powdered cellulose, maltodextrin, sorbitol, starch, or xylitol.

In conjunction with or in place of the materials listed above for the filler  
25 component, the present formulations utilize disintegrant agents. These disintegrants may be selected from those known in the art, including pregelatinized starch and sodium starch glycolate. Other useful disintegrants include croscarmellose sodium, crospovidone, starch, alginic acid, sodium alginate, clays (e.g. veegum or xanthan gum), cellulose floc, ion exchange resins, or effervescent systems, such as those  
30 utilizing food acids (such as citric acid, tartaric acid, malic acid, fumaric acid, lactic acid, adipic acid, ascorbic acid, aspartic acid, erythorbic acid, glutamic acid, and succinic acid) and an alkaline carbonate component (such as sodium bicarbonate, calcium carbonate, magnesium carbonate, potassium carbonate, ammonium

- 30 -

carbonate, etc.). The disintegrant(s) useful herein will comprise from about 4% to about 40% of the composition by weight, preferably from about 15% to about 35%, more preferably from about 20% to about 35%. Some components may have multiple functions in the formulations of this invention, acting e.g. as both a filler and  
5 a disintegrant, such a component may be referred to as a filler disintegrant and its function in a specific formulation may be singular even though its properties may allow multiple functionality.

The pharmaceutical formulations and carrier or excipient systems herein  
10 preferably also contain an antioxidant or a mixture of antioxidants, most preferably ascorbic acid. Other antioxidants which may be used include sodium ascorbate and ascorbyl palmitate, preferably in conjunction with an amount of ascorbic acid. A preferable range for the antioxidant(s) is from about 0.5% to about 15% by weight, most preferably from about 0.5% to about 5% by weight.

15

Among the formulations of this invention are pharmaceutical formulations containing a pharmaceutically effective amount of an active pharmacological agent and a carrier or excipient system comprising:

a) a filler and disintegrant component comprising between about 50%  
20 and about 87% of the formulation, with from about 4% to about 40% of the formulation comprising one or more disintegrant agents;

b) a wetting agent comprising between about 0.5% and about 2.7% of the  
formulation;

25

c) a lubricant comprising between about 0.2% and about 5.5% of the  
formulation; and

d) a glidant comprising between about 0.1% and about 5.5% of the  
30 formulation.

The percentages listed in the formulations above indicate percentages by weight of the total weight of the components listed from a) to d). The formulations



- 31 -

above also preferably contain an optional antioxidant component, preferably ascorbic acid, at a concentration of from about 0.5% to about 5.5% by weight of the formulation. The formulations are also preferably contained within a pharmaceutically acceptable capsule, such as a gel capsule, or coated with a film  
5 coating comprising from about 0.3% to about 8% by weight of the formulation.

This invention also provides a product or kit of parts comprising a compound of formula I or II as defined herein or a pharmaceutically acceptable salt thereof, and one or more estrogens, or a pharmaceutically acceptable salt thereof and optionally a  
10 bisphosphonate or a pharmaceutically acceptable salt thereof for administration as a combined preparation for simultaneous, separate or sequential use in inducement of sphincter incontinence in a mammal.

This invention also provides a pharmaceutical composition comprising a  
15 compound of formula I or II as defined herein or a pharmaceutically acceptable salt thereof, and one or more estrogens, or a pharmaceutically acceptable salt thereof and optionally a bisphosphonate or a pharmaceutically acceptable salt thereof and a pharmaceutically acceptable carrier.

20 This invention further provides a composition comprising a pharmaceutical carrier or excipient systems useful in pharmaceutical compositions utilizing as an active ingredient one or more of the compounds described herein, or a pharmaceutically acceptable salt thereof, as described herein. These pharmaceutical carrier or excipient systems may comprise, by weight:

25 a) a filler and disintegrant component comprising between about 54% and about 80% of the formulation, with the disintegrant agent(s) therein comprising from about 4% to about 40% by weight of the overall formulation;

b) a wetting agent comprising between about 0.55% and about 2.5% of  
30 the formulation;

c) a lubricant comprising between about 0.2% and about 5.5% of the formulation; and

- 32 -

d) a glidant comprising between about 0.1% and about 5.0% of the formulation.

5 The more preferred carrier or excipient systems above also optionally and preferably contain an antioxidant component, preferably ascorbic acid, at a concentration of from about 0.1% to about 5.0% by weight.

Among the carrier or excipient systems of this invention are those comprising:

10 a) a filler and disintegrant component, as described above, comprising between about 50% and about 87% of the formulation, the disintegrant(s) therein comprising from about 25% to about 35% of the formulation, by weight;

b) a wetting agent comprising between about 0.55% and about 2.7% of  
15 the formulation;

c) a lubricant comprising between about 0.2% and about 5.5% of the formulation;

20 d) a glidant comprising between about 0.1% and about 5.5% of the formulation; and

e) an antioxidant component, preferably ascorbic acid, at a concentration of from about 0.1% to about 5.5% by weight.

25

**Example 1. TSE-424 Acetate –Rapid Dissolution Formulations**

Ingredient	without Ascorbic Acid	with Ascorbic Acid
TSE-424 acetate, micronized*	10.00	10.00
Lactose NF fast flow	33.10	31.60
Microcrystalline Cellulose, NF (Avicel PH101)	25.00	25.00
Starch 1500	20.00	20.00
Sodium Lauryl Sulfate NF	1.50	1.50
Sodium Starch Glycolate	10.00	10.00
Ascorbic Acid USP	--	1.5
Syloid 244 FP	0.15	0.15
Magnesium Stearate	0.25	0.25

\* Amount in formula is adjusted for actual potency of TSE-424 as free base.

5 Corresponding adjustment made with Lactose.

The formulations given above in Table 1 were prepared by incorporating a portion of the excipients in the granulation and a portion is also added in the final blending steps as dry powders. A dissolution profile generated for the formulations demonstrated almost 90% release of the drug in 30 minutes. Thus, the unique combination of disintegrants and soluble diluents plus the incorporation of both granulated and powdered solids into the composition ensures the fastest release of drug.

15 Wet granulation of the formulations as described in Table 1 may be carried out by mixing the drug and ascorbic acid with a portion of the lactose, microcrystalline cellulose, pregelatinized starch and sodium starch glycolate. The sodium lauryl sulfate is dissolved in the water and used to granulate the mixture of powders in a high shear mixer. The granulation is dried in a fluid bed dryer to a moisture of 2-3%. The particle size of the dried granulation is controlled by passing through a mill equipped with knife-edged blades and using a 20- or 30-mesh screen.

- 34 -

The silicon dioxide and remaining lactose, microcrystalline cellulose, pregelatinized starch, and sodium starch glycolate are mixed with the milled granulation in a tumble-type mixer. The final blend is prepared by adding magnesium stearate to the tumble-type mixer and mixing. Compression is carried out on a rotary tablet press using appropriate size tooling. Coating is performed in conventional coating pans and applying the coating suspension to achieve a suitable film coat.

### Example 2. Modified TSE-424 formulation

10

%w/w

Ingredient	5% granulation
TSE-424 acetate, micronized <sup>a</sup>	5.00
Lactose NF	41.00
Microcrystalline Cellulose, NF	35.00
Pregelatinized Starch NF	10.00
Sodium Lauryl Sulfate NF	1.50
l-Ascorbic Acid USP	1.50
Sodium Starch Glycolate NF	5.50
Magnesium Stearate NF	0.50
Pur. Water USP <sup>b</sup>	qs

<sup>a</sup> Amount in formula is adjusted for actual potency of TSE-424 as free base. Corresponding adjustment made with Lactose.

<sup>b</sup> Used in process but does not appear in the final product.

15

- 35 -

**Example 3. ERA-923 formulations**

%w/w

Ingredient	10.86% granulation	11.19% granulation	17.5% granulation	17.9% granulation
ERA-923, micronized <sup>a</sup>	10.867	11.193	17.489	17.909
Lactose NF	29.000	29.000	17.380	18.000
Microcrystalline Cellulose, NF	40.633	42.807	38.000	39.090
Pregelatinized Starch NF	10.000	10.000	14.630	15.000
Sodium Lauryl Sulfate NF	2.500	--	2.500	--
l-Ascorbic Acid USP	1.500	1.500	1.500	1.500
Sodium Starch Glycolate NF	5.000	5.000	8.000	8.000
Magnesium Stearate NF	0.500	0.500	0.500	0.500
Pur. Water USP <sup>b</sup>	qs	qs	qs	qs

5     <sup>a</sup> As the Hydrochloride Monohydrate. Quantity is adjusted based on the actual potency (theory = 89.34%).

<sup>b</sup> Used in process but does not appear in the final product.

ERA-923 tablets are compressed to a tablet weight of up to 640 mg to achieve the target dose (up to 100 mg). Tablets may then be film coated.

10

**Example 4. TSE-424 at 5 % Granulation**

15     A preferred carrier or excipient system for formulating a granulation of from about 2 to about 8% by weight of one of the active pharmacological agents of this invention, preferably about 5%, may be produced utilizing the carrier or excipient components on a weight percentage; lactose from about 32% to about 38%, microcrystalline cellulose from about 32% to about 38%, pregelatinized starch from about 12% to about 16%, ascorbic acid from about 1% to about 2%, sodium lauryl sulfate from about 1% to about 2%, sodium starch glycolate from about 4% to about 8%, silicon dioxide from about 0.1% to about 0.2% and magnesium stearate from about 0.3% to about 0.7%.

20

- 36 -

A formulation of this invention utilizing TSE-424 as the active ingredient at a 5% granulation was prepared utilizing the components listed below in a granulation part of components and a dry part.

5

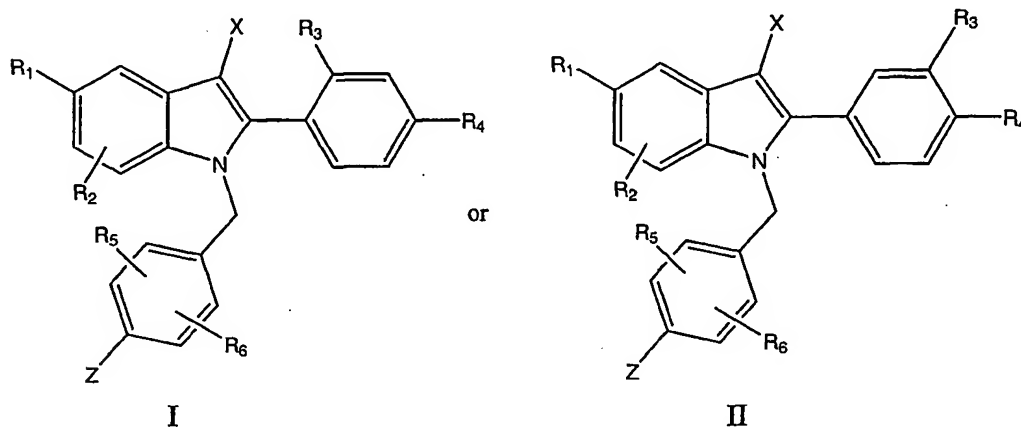
Item No.	Ingredients	Mg/Unit
<b>Granulation Part:</b>		
1	TSE-424 acetate	5.00
10 2	Lactose NF	26.60
3	Microcrystalline Cellulose NF	25.00
4	Pregelatinized Starch NF	10.00
5	Ascorbic Acid USP	1.50
6	Sodium Lauryl Sulfate NF	1.50
15 7	Sodium Starch Glycolate NF	4.00
8	Water, Purified USP	Q.S.
		-----
		73.60
<b>Dry Part:</b>		
20 9	Lactose NF (fast flo)	9.75
10	Microcrystalline Cellulose NF	10.00
11	Pregelatinized Starch NF	4.00
12	Sodium Starch Glycolate NF	2.00
13	Silicon Dioxide NF	0.15
25 14	Magnesium Stearate NF	0.50
		-----
		100.00

A film coat of White Opadry I (YS-1-18027-A) was applied to the tablets, which  
30 were compressed as follows:

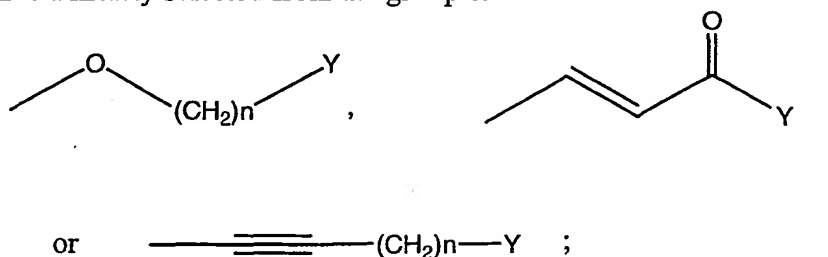
	<u>Dose of TSE-424</u>	<u>tablet weight, mg</u>	<u>mg of film coat applied/tablet</u>
	5 mg	100	6.0
	10 mg	200	8.0
35	20 mg	400	13.0

## CLAIMS:

- 5 1. A method for the inducement of sphincter continence in a mammal, the method comprising administering to a mammal in need thereof a pharmaceutically effective amount of a compound of the formulae I or II:



- 10 wherein Z is a moiety selected from the group of:



wherein:

- $R_1$  is selected from H, OH or the  $C_1$ - $C_{12}$  esters or  $C_1$ - $C_{12}$  alkyl ethers thereof, benzyloxy, or halogen; or  $C_1$ - $C_4$  halogenated ethers including trifluoromethyl ether and trichloromethyl ether.

$R_2$ ,  $R_3$ ,  $R_5$  and  $R_6$  are independently selected from H, OH or the  $C_1$ - $C_{12}$  esters or  $C_1$ - $C_{12}$  alkyl ethers thereof, halogens, or  $C_1$ - $C_4$  halogenated ethers, cyano,  $C_1$ - $C_6$  alkyl, or trifluoromethyl, with the proviso that, when  $R_1$  is H,  $R_2$  is not OH;

- 20  $R_4$  is selected from H, OH or the  $C_1$ - $C_{12}$  esters or  $C_1$ - $C_{12}$  alkyl ethers thereof, halogens, or  $C_1$ - $C_4$  halogenated ethers, benzyloxy, cyano,  $C_1$ - $C_6$  alkyl, or trifluoromethyl;

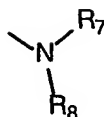
X is selected from H,  $C_1$ - $C_6$  alkyl, cyano, nitro, trifluoromethyl, halogen;

n is 1, 2 or 3;

- 38 -

Y is selected from:

a) the moiety:



wherein R<sub>7</sub> and R<sub>8</sub> are independently selected from the group of H, C<sub>1</sub>-C<sub>6</sub> alkyl, or phenyl optionally substituted by CN, C<sub>1</sub>-C<sub>6</sub> alkoxy, halogen, -OH, -CF<sub>3</sub>, or -OCF<sub>3</sub>; or R<sub>7</sub> and R<sub>8</sub> are combined by -(CH<sub>2</sub>)<sub>p</sub>-, wherein p is an integer of from 2 to 6, so as to form a ring, the ring being optionally substituted by up to three substituents selected from the group of hydroxyl, halo, C<sub>1</sub>-C<sub>4</sub>alkyl, trihalomethyl, C<sub>1</sub>-C<sub>4</sub>alkoxy, trihalomethoxy, C<sub>1</sub>-C<sub>4</sub>alkylthio, C<sub>1</sub>-C<sub>4</sub>alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub>alkylsulfonyl, hydroxy(C<sub>1</sub>-C<sub>4</sub>)alkyl, -CO<sub>2</sub>H, -CN, -CONH(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NH<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub>alkylamino, di-(C<sub>1</sub>-C<sub>4</sub>)alkylamino, -NHSO<sub>2</sub>(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHCO(C<sub>1</sub>-C<sub>4</sub>)alkyl and -NO<sub>2</sub>;

b) a five-membered saturated, unsaturated or partially unsaturated heterocycle containing up to two heteroatoms selected from the group consisting of -O-, -NH-, -N(C<sub>1</sub>-C<sub>4</sub> alkyl)-, -N=, and -S(O)<sub>m</sub>-, wherein m is an integer of from 0-2, optionally substituted with 1-3 substituents independently selected from the group consisting of hydroxyl, halo, C<sub>1</sub>-C<sub>4</sub>alkyl, trihalomethyl, C<sub>1</sub>-C<sub>4</sub>alkoxy, trihalomethoxy, C<sub>2</sub>-C<sub>4</sub>acyloxy, C<sub>1</sub>-C<sub>4</sub>alkylthio, C<sub>1</sub>-C<sub>4</sub>alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub>alkylsulfonyl, hydroxy(C<sub>1</sub>-C<sub>4</sub>)alkyl, -CO<sub>2</sub>H-, -CN, -CONHR<sub>1</sub>, -NH<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub>alkylamino, di-(C<sub>1</sub>-C<sub>4</sub>)alkylamino, -NHSO<sub>2</sub>R<sub>1</sub>, -NHCOR<sub>1</sub>, -CONH(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHSO<sub>2</sub>(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHCO(C<sub>1</sub>-C<sub>4</sub>)alkyl; -NO<sub>2</sub> and phenyl optionally substituted with 1-3 (C<sub>1</sub>-C<sub>4</sub>)alkyl;

c) a six-membered saturated, unsaturated or partially unsaturated heterocycle containing up to two heteroatoms selected from the group consisting of -O-, -NH-, -N(C<sub>1</sub>-C<sub>4</sub> alkyl)-, -N= and -S(O)<sub>m</sub>-, wherein m is an integer of from 0-2, optionally substituted with 1-3 substituents independently selected from the group consisting of hydroxyl, halo, C<sub>1</sub>-C<sub>4</sub>alkyl, trihalomethyl, C<sub>1</sub>-C<sub>4</sub>alkoxy, trihalomethoxy, C<sub>2</sub>-C<sub>4</sub>acyloxy, C<sub>1</sub>-C<sub>4</sub>alkylthio, C<sub>1</sub>-C<sub>4</sub>alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub>alkylsulfonyl, hydroxy(C<sub>1</sub>-C<sub>4</sub>)alkyl, -CO<sub>2</sub>H-, -CN, -CONHR<sub>1</sub>, -NH<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub>alkylamino, di-(C<sub>1</sub>-C<sub>4</sub>)alkylamino, -NHSO<sub>2</sub>R<sub>1</sub>, -NHCOR<sub>1</sub>, -CONH(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHSO<sub>2</sub>(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHCO(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NO<sub>2</sub>, and phenyl optionally substituted with 1-3 (C<sub>1</sub>-C<sub>4</sub>)alkyl;



- 39 -

d) a seven-membered saturated, unsaturated or partially unsaturated heterocycle containing up to two heteroatoms selected from the group consisting of -O-, -NH-, -N(C<sub>1</sub>-C<sub>4</sub> alkyl)-, -N=, and -S(O)<sub>m</sub>-, wherein m is an integer of from 0-2, optionally substituted with 1-3 substituents independently selected from the group consisting of hydrogen, hydroxyl, halo, C<sub>1</sub>-C<sub>4</sub> alkyl, trihalomethyl, C<sub>1</sub>-C<sub>4</sub> alkoxy, trihalomethoxy, C<sub>2</sub>-C<sub>4</sub>acyloxy, C<sub>1</sub>-C<sub>4</sub>alkylthio, C<sub>1</sub>-C<sub>4</sub>alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub>alkylsulfonyl, hydroxy(C<sub>1</sub>-C<sub>4</sub>)alkyl, -CO<sub>2</sub>H, -CN, -CONHR<sub>1</sub>, -NH<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub>alkylamino, di-(C<sub>1</sub>-C<sub>4</sub>)alkylamino, -NHSO<sub>2</sub>R<sub>1</sub>, -NHCOR<sub>1</sub>, -CONH(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHSO<sub>2</sub>(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHCO(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NO<sub>2</sub>, and phenyl optionally substituted with 1-3 (C<sub>1</sub>-C<sub>4</sub>)alkyl; or

e) a bicyclic heterocycle containing from 6-12 carbon atoms either bridged or fused and containing up to two heteroatoms selected from the group consisting of -O-, -NH-, -N(C<sub>1</sub>-C<sub>4</sub> alkyl)-, and -S(O)<sub>m</sub>-, wherein m is an integer of from 0-2, optionally substituted with 1-3 substituents independently selected from the group consisting of hydroxyl, halo, C<sub>1</sub>-C<sub>4</sub>alkyl, trihalomethyl, C<sub>1</sub>-C<sub>4</sub>alkoxy, trihalomethoxy, C<sub>2</sub>-C<sub>4</sub>acyloxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub>alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub>alkylsulfonyl, hydroxy(C<sub>1</sub>-C<sub>4</sub>)alkyl, -CO<sub>2</sub>H, -CN, -CONHR<sub>1</sub>, -NH<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub>alkylamino, di-(C<sub>1</sub>-C<sub>4</sub>)alkylamino, -NHSO<sub>2</sub>R<sub>1</sub>, -NHCOR<sub>1</sub>, -CONH(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHSO<sub>2</sub>(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHCO(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NO<sub>2</sub> and phenyl optionally substituted with 1-3 (C<sub>1</sub>-C<sub>4</sub>) alkyl;

or a pharmaceutically acceptable salt thereof, and optionally a pharmaceutically effective amount of one or more estrogens, or a pharmaceutically acceptable salt thereof.

2. The method of Claim 1 wherein in the compound of the formulae I or II: R<sub>1</sub> is selected from H, OH or the C<sub>1</sub>-C<sub>12</sub> esters or alkyl ethers thereof, benzyloxy, or halogen;

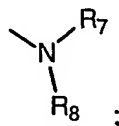
R<sub>2</sub>, R<sub>3</sub>, R<sub>5</sub>, and R<sub>6</sub> are independently selected from H, OH or the C<sub>1</sub>-C<sub>12</sub> esters or alkyl ethers thereof, halogen, cyano, C<sub>1</sub>-C<sub>6</sub> alkyl, or trihalomethyl; with the proviso that, when R<sub>1</sub> is H, R<sub>2</sub> is not OH;

R<sub>4</sub> is selected from H, OH or the C<sub>1</sub>-C<sub>12</sub> esters or alkyl ethers thereof, benzyloxy, halogen, cyano, C<sub>1</sub>-C<sub>6</sub> alkyl, or trihalomethyl;

- 40 -

X is selected from H, C<sub>1</sub>-C<sub>6</sub> alkyl, cyano, nitro, trifluoromethyl, halogen;

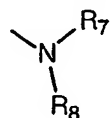
Y is the moiety



R<sub>7</sub> and R<sub>8</sub> are selected independently from H, C<sub>1</sub>-C<sub>6</sub> alkyl, or combined by  
 5 -(CH<sub>2</sub>)<sub>p</sub>-, wherein p is an integer of from 2 to 6, so as to form a ring, the ring being  
 optionally substituted by up to three substituents selected from the group of hydrogen,  
 hydroxyl, halo, C<sub>1</sub>-C<sub>4</sub>alkyl, trihalomethyl, C<sub>1</sub>-C<sub>4</sub>alkoxy, trihalomethoxy, C<sub>1</sub>-C<sub>4</sub>alkyl-  
 thio, C<sub>1</sub>-C<sub>4</sub>alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub>alkylsulfonyl, hydroxy(C<sub>1</sub>-C<sub>4</sub>)alkyl, -CO<sub>2</sub>H, -CN,  
 -CONH(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NH<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub>alkylamino, di-(C<sub>1</sub>-C<sub>4</sub>)alkyl amino, -NHSO<sub>2</sub>(C<sub>1</sub>-  
 10 C<sub>4</sub>)alkyl, -NHCO(C<sub>1</sub>-C<sub>4</sub>)alkyl, and -NO<sub>2</sub>;  
 or a pharmaceutically acceptable salt thereof.

3. A method according to Claim 2 wherein, in the compound of the  
 formulae I or II, the ring formed by a the combination of R<sub>7</sub> and R<sub>8</sub> by -(CH<sub>2</sub>)<sub>p</sub>- is  
 15 selected from aziridine, azetidine, pyrrolidine, piperidine, hexamethyleneamine or  
 heptamethyleneamine.

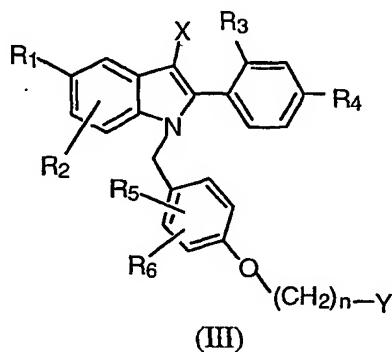
4. A method according to Claim 1 utilizing a compound of the formulae I  
 or II, wherein R<sub>1</sub> is OH; R<sub>2</sub>-R<sub>6</sub> are as defined in Claim 1; X is selected from the  
 20 group of Cl, NO<sub>2</sub>, CN, CF<sub>3</sub>, or CH<sub>3</sub>; and Y is the moiety



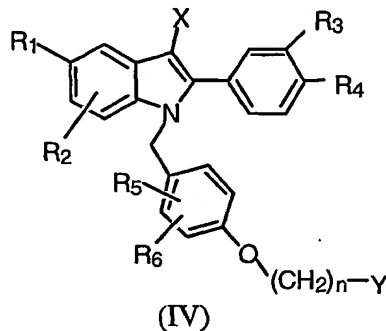
and R<sub>7</sub> and R<sub>8</sub> are concatenated together as -(CH<sub>2</sub>)<sub>r</sub>-, wherein r is an integer of from 4  
 to 6, to form a ring optionally substituted by up to three substituents selected from the  
 group of hydrogen, hydroxyl, halo, C<sub>1</sub>-C<sub>4</sub> alkyl, trihalomethyl, C<sub>1</sub>-C<sub>4</sub> alkoxy,  
 25 trihalomethoxy, C<sub>1</sub>-C<sub>4</sub> alkylthio, C<sub>1</sub>-C<sub>4</sub> alkylsulfinyl, C<sub>1</sub>-C<sub>4</sub> alkylsulfonyl, hydroxy  
 (C<sub>1</sub>-C<sub>4</sub>)alkyl, -CO<sub>2</sub>H, -CN, -CONH(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NH<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub> alkylamino, di(C<sub>1</sub>-  
 C<sub>4</sub>)alkylamino, -NHSO<sub>2</sub>(C<sub>1</sub>-C<sub>4</sub>)alkyl, -NHCO(C<sub>1</sub>-C<sub>4</sub>)alkyl, and -NO<sub>2</sub>;  
 or a pharmaceutically acceptable salt thereof.

- 41 -

5. A method for inducement of sphincter continence in a mammal, the method comprising administering to a mammal in need thereof a pharmaceutically effective amount of one or more estrogens, or a pharmaceutically acceptable salt thereof, and a pharmaceutically effective amount of a compound of the formulae III or IV:

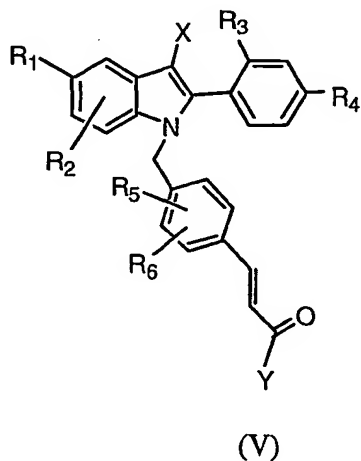


or

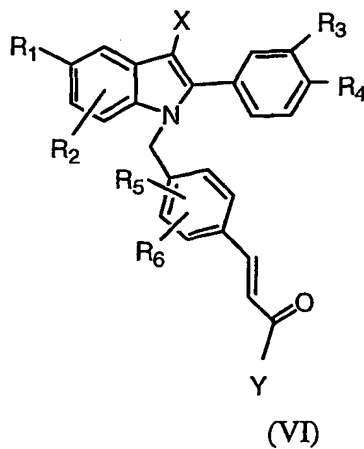


wherein R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, n, X, and Y are as defined in Claim 1, or a pharmaceutically acceptable salt thereof.

6. A method for inducement of sphincter continence in a mammal, the method comprising administering to a mammal in need thereof a pharmaceutically effective amount of one or more estrogens, or a pharmaceutically acceptable salt thereof, and a pharmaceutically effective amount of a compound of the formulae V or VI:



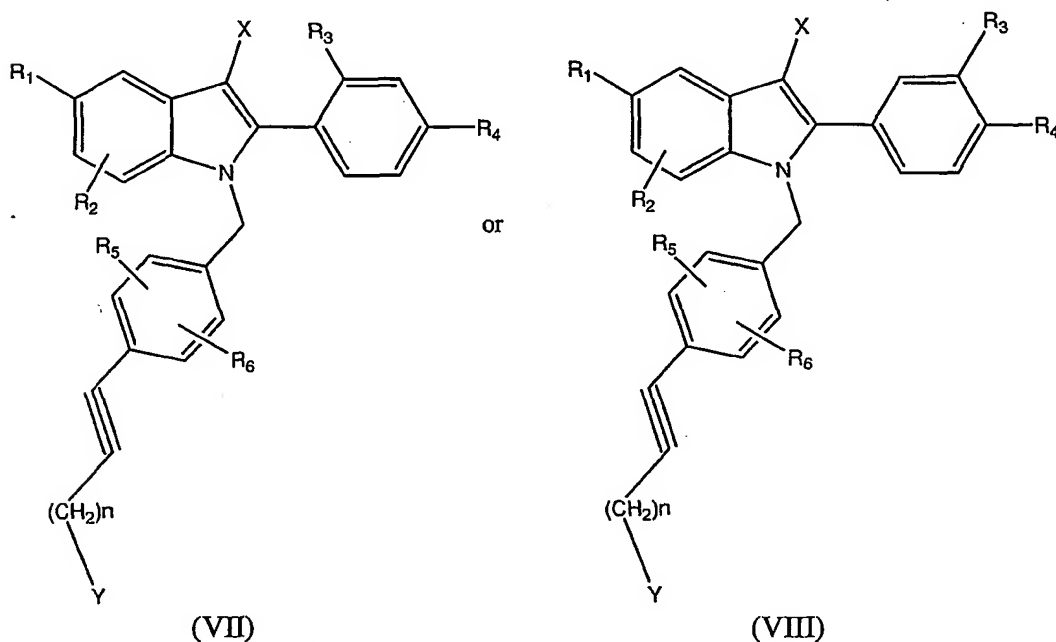
or



wherein R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, X, and Y are as defined in Claim 1, or a pharmaceutically acceptable salt thereof.

- 42 -

7. A method for inducement of sphincter continence in a mammal, the method comprising administering to a mammal in need thereof a pharmaceutically effective amount of one or more estrogens, or a pharmaceutically acceptable salt thereof, and a pharmaceutically effective amount of a compound of the formulae VII or VIII:



wherein  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$ ,  $R_5$ ,  $R_6$ ,  $n$ ,  $X$ , and  $Y$  are as defined in Claim 1, or a pharmaceutically acceptable salt thereof.

10

8. A method according to Claim 1 in which the compound of formula I or Ia is 1-[4-(2-Azepan-1-yl-ethoxy)-benzyl]-2-(4-hydroxy-phenyl)-3-methyl-1H-indol-5-ol, or a pharmaceutically effective salt thereof, or 2-(4-Hydroxy-phenyl)-3-methyl-1-(4-(2-piperidin-1-yl-ethoxy)-benzyl]-1H-indol-5-ol, or a pharmaceutically effective salt thereof.

15

9. A method of inducing sphincter continence according to any one of Claims 1 to 8 wherein the sphincter is a urinary sphincter.

20

10. A method of inducing sphincter continence according to any one of Claims 1 to 8 wherein the sphincter is an anal sphincter.

- 43 -

11. A method of inducing sphincter continence according to any one of Claims 1 to 8 wherein the sphincter is a lower esophageal sphincter.

5           12. A method according to any one of Claims 1 to 11 wherein one or more estrogens are utilized and are selected from the group of estrone, estriol, equilin, estradiene, equilenin, ethinyl estradiol, 17 $\beta$ -estradiol, 17 $\alpha$ -dihydroequilenin, 17 $\beta$ -dihydroequilenin, 17 $\alpha$ -dihydroequilin, 17 $\beta$ -dihydroequilin, menstranol, conjugated estrogenic hormones, equol, and enterolactone, or a pharmaceutically acceptable salt  
10 thereof.

13. A method according to Claim 12 wherein the one or more estrogens are conjugated estrogenic hormones.

15           14. A method for the inducement of sphincter control in a mammal according to any one of Claims 1 to 13 wherein an estrogen is utilised comprising also administering a pharmaceutically effective amount of a bisphosphonate, or a pharmaceutically effective salt thereof.

20           15. A product comprising a compound of formula I or II as defined in any one of claims 1 to 4 and 8 or a pharmaceutically acceptable salt thereof, and one or more estrogens, or a pharmaceutically acceptable salt thereof and optionally a bisphosphonate or a pharmaceutically acceptable salt thereof for administration as a combined preparation for simultaneous, separate or sequential use in inducement of  
25 sphincter incontinence in a mammal.

16. A pharmaceutical composition comprising a compound of formula I or II as defined in any one of claims 1 to 4 and 8 or a pharmaceutically acceptable salt thereof, and one or more estrogens, or a pharmaceutically acceptable salt thereof and  
30 optionally a bisphosphonate or a pharmaceutically acceptable salt thereof and a pharmaceutically acceptable carrier.

(19) World Intellectual Property Organization  
International Bureau(43) International Publication Date  
17 January 2002 (17.01.2002)

PCT

(10) International Publication Number  
WO 02/003989 A3(51) International Patent Classification<sup>7</sup>: A61K 31/404,  
31/454, 31/439, 31/496, 31/55, A61P 1/00, 13/00, A61K  
45/06(74) Agents: MILOWSKY, Arnold, S.; Wyeth, Patent Law  
Department, Five Giralda Farms, Madison, NJ 07940 et al.  
(US).

(21) International Application Number: PCT/US01/21081

(22) International Filing Date: 29 June 2001 (29.06.2001)

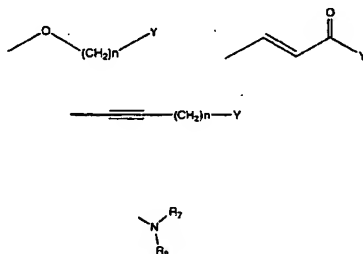
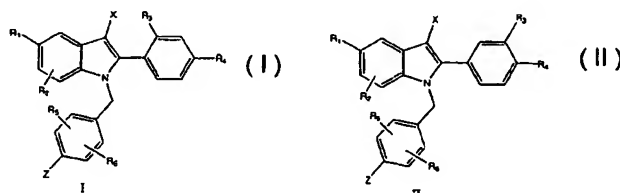
(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/216,185 6 July 2000 (06.07.2000) US  
60/216,186 6 July 2000 (06.07.2000) US(71) Applicant: WYETH [US/US]; Five Giralda Farms, Madi-  
son, NJ 07940-0874 (US).(72) Inventors: JENKINS, Simon, Nicholas; 3011 Timo-  
thy's Trail, Audubon, PA 19403 (US). ARGENTIERI,  
Thomas, Michael; 1008 Darby Drive, Yardley, PA 19067  
(US). MILLER, Christopher, Paul; 72 Meadowbrook  
Road, Strafford, PA 19087 (US).(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,  
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,  
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,  
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,  
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,  
MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK,  
SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.(84) Designated States (*regional*): ARIPO patent (GH, GM,  
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian  
patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European  
patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,  
IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF,  
CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).Published:  
— with international search report(88) Date of publication of the international search report:  
18 July 2002

[Continued on next page]

(54) Title: USE OF SUBSTITUTED INDOLE COMPOUNDS FOR TREATING SPHINCTER INCONTINENCE



(57) Abstract: This invention comprises methods of inducing or maintaining sphincter continence, or inhibiting or alleviating incontinence, in a mammal comprising administration of a compound of the formulae I or II: wherein Z is a moiety selected from the group of formulae III or IV wherein: R<sub>1</sub> is selected from H, OH or the C<sub>1</sub>-C<sub>12</sub> esters or C<sub>1</sub>-C<sub>12</sub> alkyl ethers thereof, benzyloxy, or halogens; or C1-C4 halogenated; R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, and R<sub>6</sub> are H, OH or C<sub>1</sub>-C<sub>12</sub> esters or C<sub>1</sub>-C<sub>12</sub> alkyl ethers thereof, halogens, or C<sub>1</sub>-C<sub>4</sub> halogenated ethers, CN, C<sub>1</sub>-C<sub>6</sub> alkyl, or CF<sub>3</sub>, with the proviso that, when R<sub>1</sub> is H, R<sub>2</sub> is not OH; Y is the moiety formulae V: R<sub>7</sub> and R<sub>8</sub> are alkyl or concatenated together to form an optionally substituted, nitrogen-containing ring; or a pharmaceutically acceptable salt thereof and optionally an estrogen.



---

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## INTERNATIONAL SEARCH REPORT

Int lional Application No

PCT/US 01/21081

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61K31/404 A61K31/454 A61K31/439 A61K31/496 A61K31/55  
A61P1/00 A61P13/00 A61K45/06

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61K A61P

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, CHEM ABS Data, MEDLINE, BIOSIS, EMBASE, SCISEARCH

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	WO 02 03976 A (AMERICAN HOME PROD) 17 January 2002 (2002-01-17) the whole document ---	15,16
X	WO 99 59581 A (AMERICAN HOME PROD) 25 November 1999 (1999-11-25) abstract page 3, line 24 -page 7, line 27 page 18, line 13 -page 20, line 20; claims ---	15,16
X	WO 99 59969 A (AMERICAN HOME PROD) 25 November 1999 (1999-11-25) abstract page 3, line 19 -page 7, line 18 page 9, line 18 - line 34; claims --- -/--	15,16

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*8\* document member of the same patent family

Date of the actual completion of the international search

15 April 2002

Date of mailing of the international search report

23/04/2002

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Hoff, P



## INTERNATIONAL SEARCH REPORT

Int tional Application No

PCT/US 01/21081

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 802 183 A (AMERICAN HOME PROD) 22 October 1997 (1997-10-22) cited in the application abstract page 12, line 37 -page 13, line 11; claims; examples ---	1-16
Y	EP 0 802 184 A (AMERICAN HOME PROD) 22 October 1997 (1997-10-22) cited in the application abstract page 4, line 39 - line 57; claims; examples ---	1-16
Y	US 5 880 137 A (COLLINI MICHAEL D ET AL) 9 March 1999 (1999-03-09) cited in the application the whole document ---	1-16
Y	WO 97 26876 A (CULLINAN GEORGE J ;LILLY CO ELI (US)) 31 July 1997 (1997-07-31) cited in the application the whole document ---	1-16
A	CARDOZO L ET AL: "SEX HORMONES AND THE FEMALE LOWER URINARY TRACT" PHYSIOTHERAPY, CHARTERED SOCIETY OF PHYSIOTHERAPY, LONDON, GB, vol. 80, no. 3, 1 March 1994 (1994-03-01), pages 135-138, XP000670049 ISSN: 0031-9406 the whole document -----	1-16

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 01/21081

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 0203976	A	17-01-2002	WO 0203976 A2	17-01-2002
			US 2002019373 A1	14-02-2002
			US 2002028792 A1	07-03-2002
WO 9959581	A	25-11-1999	AU 3894499 A	06-12-1999
			BG 104930 A	31-07-2001
			BR 9911040 A	13-02-2001
			CA 2329530 A1	25-11-1999
			CN 1326347 T	12-12-2001
			CZ 20004254 A3	12-12-2001
			EP 1076558 A1	21-02-2001
			HR 20000778 A1	30-06-2001
			NO 20005770 A	12-01-2001
			PL 345268 A1	03-12-2001
			SK 17202000 A3	10-07-2001
			WO 9959581 A1	25-11-1999
WO 9959969	A	25-11-1999	AU 3894299 A	06-12-1999
			CA 2331318 A1	25-11-1999
			CN 1309637 T	22-08-2001
			EP 1080073 A1	07-03-2001
			WO 9959969 A1	25-11-1999
EP 0802183	A	22-10-1997	US 5998402 A	07-12-1999
			AT 206701 T	15-10-2001
			AU 710149 B2	16-09-1999
			AU 1892097 A	23-10-1997
			BR 9701895 A	10-11-1998
			CA 2203079 A1	19-10-1997
			CN 1170719 A	21-01-1998
			CZ 9701175 A3	12-11-1997
			DE 69707189 D1	15-11-2001
			DK 802183 T3	04-02-2002
			EP 0802183 A1	22-10-1997
			ES 2162198 T3	16-12-2001
			HU 9700777 A2	28-06-1999
			JP 10036346 A	10-02-1998
			NO 971815 A	20-10-1997
			NZ 314601 A	29-09-1999
			SI 802183 T1	31-12-2001
			SK 47297 A3	05-11-1997
			TW 381093 B	01-02-2000
			ZA 9703302 A	19-10-1998
			CA 2203078 A1	04-10-1998
			US 6127404 A	03-10-2000
			US 6326367 B1	04-12-2001
			US 6232307 B1	15-05-2001
			US 6225308 B1	01-05-2001
			US 2001021719 A1	13-09-2001
EP 0802184	A	22-10-1997	AU 718888 B2	20-04-2000
			AU 1892197 A	23-10-1997
			BR 9701879 A	29-09-1998
			CA 2203074 A1	19-10-1997
			CN 1168373 A	24-12-1997
			CZ 9701176 A3	17-12-1997
			EP 0802184 A1	22-10-1997
			HU 9700779 A1	28-09-1999

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 01/21081

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0802184	A		JP 10036347 A	10-02-1998
			NO 971814 A	20-10-1997
			SK 47197 A3	05-11-1997
			TW 397821 B	11-07-2000
			ZA 9703299 A	19-10-1998
			CA 2203073 A1	19-10-1997
<hr/>				
US 5880137	A	09-03-1999	US 5780497 A	14-07-1998
<hr/>				
WO 9726876	A	31-07-1997	AU 732473 B2	26-04-2001
			AU 1838697 A	20-08-1997
			CN 1213303 A	07-04-1999
			CZ 9802355 A3	17-03-1999
			EP 0910378 A1	28-04-1999
			HU 9903440 A2	28-06-2000
			JP 2000503991 T	04-04-2000
			NO 983453 A	11-09-1998
			WO 9726876 A1	31-07-1997
			PL 328082 A1	04-01-1999
			US 5985865 A	16-11-1999
			US 6113876 A	05-09-2000